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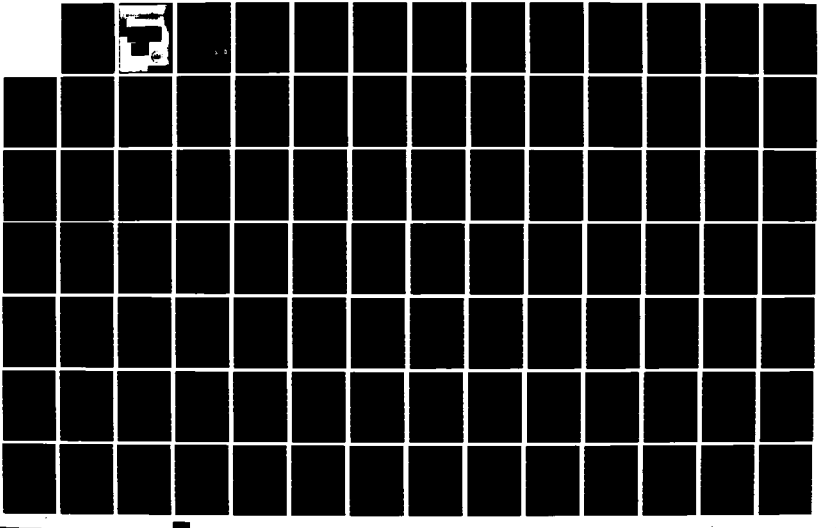

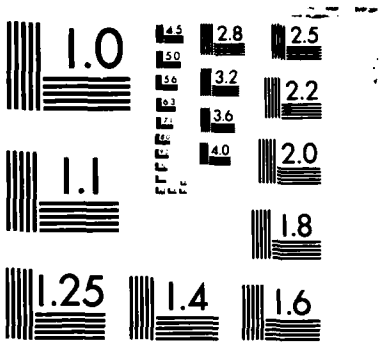

AN EMPIRICAL STUDY TO ENHANCE THE REENLISTMENT PROCESS OF CIVILIAN PERSONNEL WITH PRIOR MILITARY SERVICE: FINAL REPORT

Final Report ONR 85-1, April 1985

Stanley P. Stephenson, Jr., Margaret E. Mitchell, Leland L. Beik, David A. Macpherson, Stanley D. Fitch, and David R. Ellison

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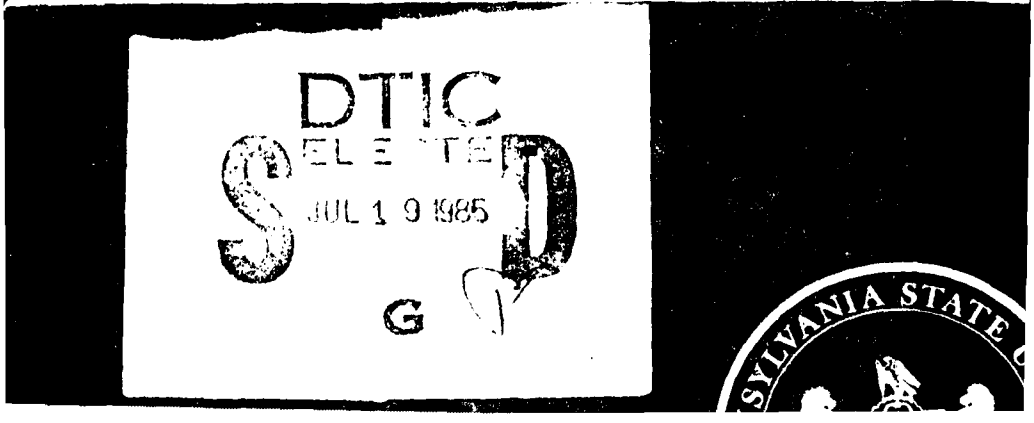

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This is a final report of a multidisciplinary empirical inquiry regarding the use of prior-service individuals to meet current and future U.S. Navy enlistment goals, especially at the mid-grade petty officer level. Data used are primarily from the Defense Military Manpower Center (DMDC) for the period 1973 to 1982. Six new studies are included in this summary report. Each study seeks to compare prior-service individuals with other enlistees.

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Finally, and most importantly, it was also a privilege to work with the following dedicated, creative and stimulating group of professionals, the project team members.

Name	Current Position
Dr. Leland L. Beik	Professor of Marketing, The Pennsylvania State University
Dr. David R. Ellison	CDR, U.S. Navy

Dr. Margaret E. Mitchell	Assistant Professor of Industrial Relations and Human Resources, Rutgers University
Stanley D. Fitch	Senior Programmer Analyst, Department of Agronomy, The Pennsylvania State University
David A. Macpherson	Ph.D. Candidate and Instructor, Department of Economics, The Pennsylvania State University

This team completed six professional meeting papers, four technical reports and this final report. In addition, David Ellison's Ph.D. dissertation, "Predicting Involuntary and Voluntary Turnover of Organizational Entrants and Reentrants" was supported by this project and made available to the Office of Naval Research. Project team members represented the U.S. Navy at an All Service Symposium, "Recruiting/Accession Research Information Exchange," in San Antonio, Texas, February 7-8, 1984, and represented the United States at a NATO Conference on Military Motivation and Morale, Brussels, May 28, 1984.

Stanley P. Stephenson, Jr.
April 1985
Principal Investigator and Associate
Professor of Management,
The University of Hartford
West Hartford, CT

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Report	DMDC Data
Chapter 4 "Wage Growth"	A sample of enlisted personnel who entered the Navy for the first time during FY74 to FY77. The sample included those who were in the Navy for less than three months and those who entered the Navy as petty officers (that is, paygrades above E-3). A sample of 11,527 individuals was chosen from a population of 298,554.
Chapter 5 "Time Between Separations and Reentry"	A sample of 15,993 enlisted men who entered the Navy for the first time during fiscal years 1974 to 1977 and reentered the Navy during FY74 to FY82.
Chapter 6 "Job Performance Ratings"	A sample of 401 enlisted personnel who entered the Navy for the first time during FY74 to FY76 and stayed in the Navy for at least three months and had a complete performance record at either the St. Louis military archives or in Washington, D.C. for active personnel.
Chapter 7 "Voluntary and Involuntary Turnover"	All FY78 accessions, those who enlisted in the Navy in FY78, including 79,652 men and women new entrants and 6,383 reentrants. "Reentrants" defined by DMDC cohort file indicator; "Survivors" were persons who had not left involuntarily by the end of FY82; "Stayers" were those "survivors" who had not left voluntarily in the same time period.

SUMMARY TABLE 1.2 Data Sources and Definitions

Report	DMDC Data
Tech. Report 1 "Profile of Prior-Service Accessions"	All 74,181 men who entered the Navy in FY73 to FY81 and had a prior service indicator in their DMDC file.
Tech. Report 2 "Separation of Prior-Service Personnel"	All men who entered the Navy in FY73 to 76, FY78 and FY79. The focus on which years individuals entered and left the military.
Tech. Report 3 "Segmentation of Prior-Service Reentrants"	All 6,327 persons who were in a CREO rating and reentered the Navy in FY78 to FY81

Important Note: Tech. Reports 1, 2 and 3 depended on the DMDC prior-service indicator. Such persons had been in military service, and had left and reentered after a separation of at least 24 hours.

Tech. Report 4	All 71,678 men who were in a CREO rating and either reentered the Navy during FY72 to FY81 or entered the Navy during FY74 to FY78. Key definitions: "Stayers," men whose service obligations exceed 72 months; "Nonreturners," men who left the Navy permanently and had at most 72 months of actual military service; "Reentrants," a DMDC prior-service person, one who returns to a MEP station and has a second cohort file.
Chapter 2 "Reenlistment of Prior-Service Personnel"	Same data and definitions as Tech. Report 4
Chapter 3 "Career Decisions"	The initial population included all 304,600 men who entered the Navy during FY74 to FY77 and served at least 3 months. Samples were drawn from this population to obtain an equal 12,000 each year.

Important Note: In Chapters 3, 4, and 5 the following definitions were used: "Stayers," men with at least 72 months of continuous actual service; "Leavers," men with 72 or fewer months of continuous service; "Reentrants" had a service break of at least 3 months.

- development of a tracking procedure (for example, postcards) that could be used to track the location of desirable prior-service individuals
- improvement in the data quality, especially of the performance appraisal system
- broad integrative study of overall military manpower needs and the ways to best meet these needs
- comparison of different types of advertising campaigns (for example, comparison of attempts to recruit young people to learn a skill that is applicable to the civilian labor market and attempts to recruit young people to have a career in the Navy)
- assessment of the cost-effectiveness of the present performance appraisal system
- development of a management information system for performance records
- exploration of the race difference found for rate of reentry, performance ratings, and paygrade advancement
- further investigation of the relationship between military and civilian earnings

c. The segment of actual reentries is likely to remain limited in numbers and qualifications unless more of the previous two segments are persuaded to reenlist, thereby increasing the flow of qualified people.

2. A practical procedure should be developed for scoring individuals in terms of how attractive they are as recruits. This procedure is demonstrated in Chapter 2 and is worthy of further research and development consideration.

3. The preceding recommendation could become one component of a more comprehensive personnel information system. Information system development, however, should be based on a set of well understood and compatible strategies.

4. Consider changing the forms of advertisements. For example, refer to the Navy as an attractive career, not just a means of obtaining a skill to be used in civilian life.

5. Used a multiple-indicator approach to target potentially successful returners--for example, include indicators such as job category, paygrade attained, behavioral data, performance data, and reason for discharge.

6. Track prior-service personnel for more than two years.

7. Upgrade the quality and accessibility of DMDC and performance records. Consider the cost-effectiveness of monitoring some systems without such an upgrading.

8. Monitor the procedure used to determine paygrade change and performance ratings vis-a-vis the race of the individual.

Future Research Needs

The results of these analyses suggested the need for future research. This research includes the following:

- development of an early screening method for the identification of prior-service individuals who are likely to fulfill the needs of the Navy for skilled personnel (see Chapter 2 for a more detailed description)

SUMMARY TABLE 1.1 (continued)

Original Research Questions	Location Where Addressed
Contract Modification Questions	
- Are prior-service personnel (RZ's) relatively poorer performers during initial enlistments?	--Chapter 6, "Job Performance"
- To what extent is past military performance correlated with subsequent earnings growth and time out of the military?	--Chapter 6, "Job Performance"
- For prior-service personnel, what factors affect the level of and changes in first and second term performance rating?	--Chapter 6, "Job Performance"
- Assuming individuals do not return to their original location of enlistment, there is a need to secure more current locations for RZ recruiting. How should this be obtained?	--Tracking procedures via postcards, SSA records, IRS records or VA records could enhance the DOD Separation Address File. A separate study is needed of this issue, however.
- What individual "tracking" procedures by location and quality can be developed from existing records, like DD Form 214 or more appropriate records, to enhance the recruiting of selected prior-service personnel?	--Tech. Report 4, "Prospects for Reenlistment" --Chapter 7, "A Segmentation Analysis"

[a]This study could not be directly addressed because of the limitations of the DMDC data.

SUMMARY TABLE 1.1 (continued)

Original Research Questions	Location Where Addressed
Study 3: Reenlistment Timing Determinants	
3.1 What factors influence the rate of reentering the service for prior military personnel? In particular, private sector economic conditions, individual educational and prior military experiences, as well as race, rate, age, and other relevant personal attributes were considered.	--Chapter 5, "Time Between Separation and Reentry" --Tech. Report 4, "Prospects for Reenlistment" --Chapter 7, "Voluntary and Involuntary Turnover"
3.2 By processing the results obtained in 3.1, the expected length of time out of the service as a function of individual characteristics and economic conditions, was predicted.	--Chapter 5, "Time Between Separations and Reentry" --Tech. Report 3, "Segmentation" --Chapter 2, "A Segmentation Analysis" --Tech. Report 2, "Separation of Prior-Service Personnel"
Study 4: Summary Report	
4.1 What salary and benefit mix should be emphasized when recruiting prior-service personnel?	Several Studies have indirectly addressed this question. These include: --Chapter 7, "Voluntary and Involuntary Turnover" --Chapter 2,[a] "A Segmentation Analysis"
4.2 What types of advertisements and sales approaches will be most effective for attracting different types of prior-service individuals?	--Tech. Report 4, "Prospects for Reenlistment" --Chapter 2, "A Segmentation Analysis"
4.3 How should prior-service personnel be tracked, and how can they be reached at various times after leaving the service?	--Tech. Report 4, "Prospects for Reenlistment" --Chapter 2, "A Segmentation Analysis"
4.4 What career development aspects are most intriguing to someone considering reenlistment?	--Tech. Report 4, "Prospects for Reenlistment" --Chapter 2, "A Segmentation Analysis"

SUMMARY TABLE 1.1 Location Guide

Original Research Questions	Location Where Addressed
Study 1: Segmentation Process	
1.1 What comparisons inherent in the cohort files can be developed to aid recruiting practices?	--Tech. Report 3, "Segmentation..." --Tech. Report 4, "Prospects for Reenlistment" --Chapter 2, "A Segmentation Analysis" --Chapter 7, "Voluntary and Involuntary Turnover"
1.2 Which characteristics maintained in the cohort files best identify differences among those remaining in service; those leaving the service and those returning to active duty?	--Tech. Report 3, "Segmentation..." --Tech. Report 4, "Prospects for Reenlistment" --Chapter 3, "Career Decisions" --Chapter 7, "Voluntary and Involuntary Turnover"
1.3 Having derived numbers of meaningful descriptors for each group, which characteristics best distinguish prospective segments for reenlistment?	--Tech. Report 3, "Segmentation..." --Chapter 2, "A Segmentation Analysis"
1.4 Once segmentation data have been established, how can they provide insight into how best to recruit prior-service personnel?	--Tech. Report 3, "Segmentation..." --Chapter 2, "A Segmentation Analysis"
Study 2: Career Development Determinants	
2.1 What types of persons are likely to remain in the service, leave the service permanently, or leave the service temporarily? That is, how do personal and demographic factors and economic conditions affect the individual's choice among these three outcomes?	--Chapter 3, "Career Decisions" --(see also studies listed under 1.2 above)
2.2 How are individual career outcomes (e.g., earnings and occupational growth patterns) affected by personal, demographic, and economic characteristics, after one controls for the three-way self-selection in question 2.1?	--Chapter 4, "Wage Growth"

relative importance and in terms of the relating shortage. Third, inasmuch as several policy research questions raised concern about personnel behavior both while in the military and the period after a term of service, analysts sometimes had to select enlistment cohorts starting as early as 1973. This point was especially germane in the studies of wage growth and military career development.

After carefully considering these factors we decided not to force each of the research questions to be addressed with exactly the same DMDC cohort subfiles. In addition, some slight differences exist between reports in definitions regarding who is a military "prior service," who are "reentrants," "leavers," "stayers," and so forth. Summary Table 1.1 indicated which of the several reports addressed the different policy research questions. To assist the reader comparing similarities and differences across studies, we list in Summary Table 1.2 the various data sources and definitions of each study.

A Summary of Policy Recommendations

The results of these studies suggests a number of policy implications. Specific policy implications are presented in each chapter. These recommendations include the following[a]:

1. To the extent manning requirements demand attention to prior-service, CREO personnel, the following recommendations apply:
    a. Qualitatively and numerically, first attention should be directed to the longer-term separators.
    b. Second consideration should be given to the numerically larger and qualitatively adequate segment of nonreturners.

---

[a]See the section on Policy Implications in each chapter for a complete list of these recommendations.

Chapter 5. "Time Between Segmentation and Reentry for Navy Enlisted Personnel"

Chapter 6. "Job Performance Ratings of Navy Personnel"

Chapter 7. "Voluntary and Involuntary Turnover of Navy Enlisted Personnel"

Location Guide

This project was guided by the policy research questions which were raised in the original proposal and refined in the subsequent modification. Some readers may wish to know where in this report to find the questions discussed. Summary Table 1.1, A Location Guide, provides this information.

Data Descriptions and Sources

This project addressed issues concerning prior-service Navy personnel by studying all enlisted men who entered the United States Navy during the post-draft era. We were greatly aided in this effort by the availability of data from DMDC. Detailed postdraft cohort records began in 1973 and were available up to the end of fiscal year (FY) 1982 at the time most of the reports here were written. One strategy used here was a thorough exploration of the DMDC data. Several issues arose, however, which led analysts to focus on different data subsets. First, preliminary analysis (Tech. Report 1) discovered substantial structural differences in the extent of prior-service enlistments before and after 1977. After 1977 there was a sharp jump, nearly 19 percent, in the overall average number of reentrants (7,469 to 8,875 per year). Second, the U.S. Navy Recruiting Command expressed a keen interest in obtaining enlisted personnel to fill slots deemed "critical" in terms of their

set of studies, included in Chapters 3 and 4 of this volume, examine career development determinants such as the relative rate of earnings growth in the military. A fourth set of studies is concerned with labor turnover. These included Chapters 5 and 7 of this report. The latter is an outgrowth of a Ph.D. dissertation sponsored by this study.

The overall report includes six studies in this volume and four previously written technical reports. To facilitate subsequent summary comments, it is helpful to list each by title. (More complete references are included at the end of this volume.)

Technical Reports

1. Profile of Prior-Service Accessions to the U.S. Navy. Tech. Report ONR 83-1, April 1983.
2. Separation of Prior-Service Navy Personnel Over Two- and Six-Year Periods. Tech. Report ONR 83-2, April 1983.
3. Segmentation of Prior-Service Reentrants in the U.S. Navy. Tech. Report ONR 83-3, April 1983.
4. Prospects for Reenlistment of Prior-Service Personnel. Tech. Report ONR 84-4, February 1984.

Technical reports 1 and 2 are very preliminary inquiries as to the characteristics of prior-service personnel in military, demographic, and socioeconomic terms. Reports 3 and 4 are more directly tied to project goals.

In addition to the four previously submitted technical reports, the main body of the report is contained in the six studies presented here. These chapters and titles are as follows:

Chapter 2. "Reenlistment of Prior Service Personnel: A Segmentation Analysis"

Chapter 3. "Career Decisions of Navy Enlisted Personnel"

Chapter 4. "Wage Growth of Navy Enlisted Personnel"

"ineligible for reenlistment, had involuntarily left the military, or had an adverse waiver status." The second conclusion is more subjective and is derived both from the empirical studies as well as three years of interacting with military manpower specialists in the federal government, universities, and the military. For instance, complete performance appraisals simply could not be located for 66 percent of a random sample of 1,100 past and current enlisted men. How then can recruiters select the best candidates? Also, there are "caps" on the extent of career development via promotion which arise due to time in rank, internal training requirements, and congressional limits on military jobs. In addition to these two overall conclusions, a number of particular policy-relevant implications are made in the first section of each chapter of this volume.

Report Contents

Four sets of analyses are addressed in the overall report. The first set is descriptive and used individual demographic, socioeconomic, and military experience measures in the DMDC files to assess the prior-service community. The most thorough descriptive reports are Technical Reports ONR 82-1 and 83-2, published previously. More analytical discussions are found here in Chapters 2 and 3. The second set of reports adapts market research methods to identify those persons most desirable for recruiting. Technical Reports ONR 83-3 and ONR 83-4 as well as Chapter 2 in this volume comprise this set. The reports are highlighted by the methodology which adapts market segmentation analysis to Navy recruiting and offers a practical procedure for recruiters to score individuals on their attractiveness as potential recruits. The third

by focusing on one group, prior-service individuals, and the extent to which this group can enable the Navy to offset current and expected mid-grade petty officer shortages. The studies are empirical, use readily available data sources from the Defense Military Data Center (DMDC), and repeatedly examine prior-service individuals relative to other persons in terms of a variety of descriptors and behavioral characteristics. The underlying premise is that analyses of past trends, performances, and behaviors can be used to plan and evaluate future options like special recruiting efforts targeted at the prior-service community.

Two rather fundamental conclusions emerge from the analysis:

1. The prior-service market in terms of quantity and relative quality is not without qualification an attractive source of trained military manpower to fill petty officer shortages in the next three to five years. In order to make optimal use of this market, multivariate screening procedures must be developed so that prior-service personnel are targeted only if they are likely to fill needed positions and remain in the Navy for a reasonable length of time.
2. It is incumbent on the Navy to develop an overall human resource strategy from which internally consistent operational procedures can be developed with respect to recruiting, training and development, retention, compensation, performance appraisal, promotion, and retirement of all enlisted personnel, including prior-service individuals.

The first conclusion is derived from several empirical studies in this report, especially Chapter 2. For example, in that chapter, Leland Beik finds between 44 to 57 percent of the various CREO reenlistments were

CHAPTER 1

INTRODUCTION

"The Defense Department, after four years of increasingly successful recruiting, is finding that young men and women have become less interested in enlisting in the armed forces."[1] Part of the problem is the decline in the number of young people 18 to 21 years old, which was 17 million in 1981, an expected 15.4 million in 1985, and 13 million by 1995. Part of the problem is reflected in a change in intention to enlist. The Youth Tracking Attitude Study, a national probablistic sample of potential military enlistees done each year since 1975, found that enlistment intentions in 1984 were the lowest since 1979, a poor recruiting year. The military staffing problem is further exacerbated by the fact that new weapons and new ships have created even greater needs for personnel.

The Navy, which had 479 ships in 1980 and 523 ships in 1984, is soon expected to have 600 ships. This means that the current number of sailors, 571,000, will have to expand to meet this new need.[2]

The combined pressures of fewer enlistees to fill existing jobs and even more positions to be filled in new ships raises the importance of strategic planning to meet military manpower needs. This study, or more correctly, this series of studies, is intended to contribute to discussions regarding ways to meet military manpower requirements. It does so

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[1] Richard Halloran, "Enlistment Decline Brings Call for New Draft," The New York Times, April 9, 1985, p. 1.

[2] Ibid.

LIST OF FIGURES

CHAPTER 2

REENLISTMENT OF PRIOR-SERVICE PERSONNEL: A SEGMENTATION ANALYSIS

Leland Beik

The purpose of this chapter is to provide a nontechnical summary of "Prospects For Reenlistment of Prior-Service Personnel," Technical Report ONR-4, February 1984, by Beik and Fitch. The objectives and recommendations of the research will be reviewed in the sections immediately following. The subsequent sections will display and interpret sufficient numbers and percentages to substantiate conclusions and recommendations. A foundation is thus formed for consideration or reconsideration of policy with respect to replenishing chronically deficient, mid-grade, petty-office ratings.

The Chapter in Brief

The overall objective of the research was to provide a foundation for strategy and policy formation with regard to recruiting prior-service personnel. The implied strategy for recruiting was to divide the prior-service market into identifiable segments and then to target the best of these for specialized reenlistment efforts. Specifically, a market segmentation analysis was applied to distinguish favorable from unfavorable segments among selected critical reenlistment eligibility opportunity (CREO) ratings.*

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*A brief explanation of methodology is provided in the appendix, p. 48.

Basically, the segments were developed by comparing individuals who reenlisted after a break in service (reentries) with those who separated and did not reenter (nonreturners). In process, it was necessary to identify unbroken service individuals whose accumulated terms limited the chance of observing any return or nonreturn decisions. These relatively long-term accessions (stayers) were defined as having acquired over 72 months of total service. Analytically, the stayers were compared with men who separated with total service less than or possibly equal to 72 months (leavers) in order to enable comparison of the subsequent decisions to return to active duty or not.

The four selected groups of CREOs could thus be considered as segments. For other purposes, each CREO could be subdivided into stayers, nonreturners, and reentries to create finer segment subdivisions. By identifying (1) numbers per segment, (2) typical characteristics of segment members, and (3) locating possible geographic concentrations, recruiting efforts could be targeted toward favorable and away from unfavorable segments.

The Problem of Segment Size

This section of the chapter shows how the total records break out by CREO segments. Possible bias as a result of missing data is also noted. Each of the four CREOs is then divided into the stayer, nonreturner, and reentry base segments, and the ability or inability to classify these segments adequately becomes clear. The accessible numbers of recruits per segment begin to appear limited. An even further limitation is apparent were these base segments to be traced to geographical districts on an annual basis.

The Analytical Base

Not all the initial 71,678 cases remained available for analysis. Some missing or mispunched data occurred in almost all the variables and the difficulty was substantial for a few. Over all, 4,855 or 6.8 percent of the cases were missing in the final analysis. Although the number differs for some calculations, 66,823 became the base total for most of the analysis.

With a near census analyzed, the following tables represent what happened during the period covered. As for current and future policy decisions, the 66,000 plus cases represent a very large sample. To the extent that economic and other conditions varied during the period, many environmental factors which have an impact on recruiting are "averaged" into the data. The assumption remains that current interpretations of past data are contingent upon little substantive change in environmental factors.

In the following tables and paragraphs, some numbers and percentages are cited which may not be found in Technical Report 4. Computer printouts supplied the source for any supplementary figures.

Tables 2.1 and 2.2 show the distribution of cases among the CREO segments and among the stayer, nonreturner, and reentry breakdowns. The main propulsion and engineering support CREOs are each roughly twice the size of either the operations technicians or the weapons technicians. Nonreturners dominate the Table 2.2 breakdown with stayers about half as numerous and reentries somewhat over one-tenth as numerous as the nonreturners. The total continues to approach a census, but the dispersion of missing cases varies from 4.0 percent for the operations technicians to 8.0 percent for main propulsion. The percentages of missing cases

TABLE 2.1

Distribution of Cases by CREO Segments

	Initial Total	Missing Cases	Total Analyzed
Operations Technicians	10,459 14.6%	421 4.0%	10,038* 15.0%
Weapons Technicians	11,560 16.1%	774 6.7%	10,786 16.1%
Main Propulsion	26,419 36.9%	2,124 8.0%	24,295 36.4%
Engineering Support	23,240 32.4%	1,536 6.6%	21,704 32.5%
Total	71,678 100.0%	4,855 6.8%	66,823 100.0%

Source: Beik and Fitch, 1984, Table 1, p. 18.

*Column percentages are reported in columns one and three. In the middle column, the percentages represent the proportion of cases missing from the initial total in the row.

TABLE 2.2

Distribution of Cases by Enlistment-Decision Segments

	Initial Total	Missing Data	Total Analyzed
Stayers	20,161 28.1%	288 1.4%	19,873* 29.7%
Non-returners	43,948 61.3%	2,427 5.5%	41,521 62.1%
Reentries	7,569 10.6%	2,140 28.3%	5,429 8.1%
Total	71,678 100.0%	4,855 6.8%	66,823 100.0%

Source: Beik and Fitch, 1984, Table 1, p. 18.

*Column percentages are reported in columns one and three. In the middle column, the percentages represent the proportion of cases missing from the initial total in the row.

vary more extensively, for instance, between stayers, 1.4 percent, and reentries, 28.3 percent. A small amount of statistical bias is possible where the percentages for CREO segments vary slightly from the 6.8 percent average. There is greater danger of bias in that certain classes of reentries may populate the 28.3 percent of missing reentry cases.

The causes of imperfect records may be traced from errors upon initial collection, through errors in communication channels, to management of computer files, storage, and retrieval. Massive as the task is, improvement of records is important for current information systems, for research, and is doubtless critical for many individuals.

The Four CREO Segments

In Technical Report 4 on which this chapter is based, the stayers were directly compared with the leavers, and the reentries with the nonreturners. Some additional cases were lost during the latter stage of analysis so all the numbers in the following tables may not precisely match those in the prior report. Also, it is technically more accurate to interpret the stayer row in the following tables separately from the reentry-nonreturner pairs. Cross classifying CREOs by enlistment-decision segments, nevertheless, is of direct interest.

Operations technicians. It is notable, in Table 2.3, that some 5,000 or 53.0 percent of the operations technicians (OTs) were stayers. Nonreturners provided the second largest total and percentage, while only 438 or 4.4 percent were actually reentries. Compared to the other three CREOs, there was a substantial abundance of stayers and a relative scarcity of reentries.

TABLE 2.3

Ability to Classify the Enlistment-Decision Segments of the Operations Technicians

	Correctly Classified	Incorrectly Classified	Total
Stayers	3,343 62.8%	1,979 37.2%	5,322* 53.0%
Non-returners	4,154 97.1%	124 2.9%	4,278 42.6%
Reentries	108 24.7%	330 75.3%	438 4.4%
Total	7,605 75.8%	2,433 24.2%	10,038 100.0%

Source: Figures 4 and 5, pp. 37 and 46 in Beik and Fitch, 1984.

*Row percentages are displayed in the first two columns and column percentages in the third.

The relative ability or inability of the variables in the DMDC records to classify the segments is apparent in Table 2.3. About 62 percent of the stayers could be correctly classified with the characteristics available. Upon comparing nonreturners with reentries, nearly all the nonreturners could be identified. The reentries, on the contrary, were correctly classified only 25 percent of the time. Three-quarters of the reentries were misclassified; they "looked like" the nonreturners.

If the stayers were all career men, they would not become available as a prior-service market target. Among all four CREOs, actually, over 80 percent of the stayers separated within 24 months after completing their 76 plus months of service. This turnover indicates a continuing supply although with some delay as compared to others in the analysis.

One simple marketing technique was expected to apply in this research. By analyzing the characteristics (or variables) of reentries, one could find others like them among men who had separated from the Navy. The nonreturners similar to the reentries would be potentially easier to recruit and the common characteristics would suggest some of the means of persuasion. The numerical reasons this technique failed are evident in Table 2.3. The 438 reentries in the table were overwhelmed in discriminant analysis by the tenfold larger number of nonreturners. While most reentries were misclassified as nonreturners, only 124 or 2.9 percent of the nonreturners were misclassified as or looked like the reentries. A subsegment of potentially persuasible nonreturners did not materialize. The nonreturners are apparently well established outside the Navy since they have not shown sufficient interest to reenlist over the period analyzed.

The reentries, temporarily, are not a direct segment of interest. Like the stayers, they again become available as prior-service people when separated.

The numbers of prior-service and potential prior-service OTs are hardly ample when broken down by district and year. If the 5,322 stayers are divided by the 42 districts and again by five years, the average number available per district per year would be approximately 25.* Dividing the nonreturners and reentries by the districts and eight years, the available numbers would be about 13 and one respectively.

If saving the cost of training OTs is an important reason for seeking prior-service individuals, that is realized for less than half of the actual reentries. Of 433 reentries traceable for the purpose, 235 or 54.3 percent obtained their CREO rating after rather than before reentry.

Several conclusions follow from the analysis of the OT stayer, nonreturner, and reentry segments. Classification power is sufficient to identify stayers and nonreturners quite well, but it is far less adequate for reentries. When spread evenly by districts on a per year basis, the available numbers appear insufficient to support targeting the segments, especially if added costs are involved. Any possible savings from reenlisting trained electronic and systems technicians also seem minimal.

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*Recall that non-prior-service men were entered in the data set for only the first five years of the period, while prior-service men were entered during all eight years. Of course the actual numbers would not be this smoothly spread by districts or by years; the number estimates typical size.

Weapons technicians. The way to interpret Table 2.4 is similar to Table 2.3. For brevity, only the key statistics will be reported for the weapons technicians (WTs) and subsequent CREOs. Among the 10,786 WTs, about 27 percent were stayers, 64 percent were nonreturners, and about nine percent were reentries. The ability to classify correctly was limited to 27.5 percent for stayers and 10.0 percent for reentries. Only 2.1 percent of nonreturners exhibited the same characteristics as reentries. The remaining 97.9 percent were accurately classified by the data.

The potential number of prior-service accessions remained inadequate on a per district, per year basis. The respective numbers were about 14 stayers, 21 nonreturners, and three reentries. Of the 967 reentries, in addition, 223 or 23.1 percent obtained their WT rating after reentry. In other words, over one-fifth needed specialized training after being readmitted to the Navy.

The average flow of reentries hardly looks sufficient to support the costs of specialized targeting plus the costs of training WTs. Standard advertising and recruiting practices may continue to attract a certain number of trained, prior-service individuals. Properly screened, the latter remain a viable although sparce source of CREO personnel.

Main propulsion. The main propulsion (MP) personnel turned out to be very like the WTs with respect to percentage distributions even though the total of 24,295 was more than double that of the WTs during the period. In Table 2.5, nine percent were reentries, 61 percent were nonreturners, and 30 percent were stayers.

TABLE 2.4

Ability to Classify the Enlistment-Decision Segments of the Weapons Technicians

	Correctly Classified	Incorrectly Classified	Total
Stayers	792 27.5%	2,083 72.5%	2,875* 26.6%
Non-returners	6,799 95.9%	145 2.1%	6,944 64.4%
Reentries	97 10.0%	870 90.0%	967 9.0%
Total	7,688 71.3%	3,089 28.7%	10,786 100.0%

Source: Figures 6 and 7, pp. 52 and 57 in Beik and Fitch, 1984.

*Row percentages are displayed in the first two columns and column percentages in the third.

TABLE 2.5

Ability to Classify the Enlistment-Decision Segments of the Main Propulsion Occupations

	Correctly Classified	Incorrectly Classified	Total
Stayers	1,772 24.1%	5,583 75.9%	7,355* 30.3%
Non-returners	14,410 97.9%	302 2.1%	14,712 60.5%
Reentries	234 10.5%	1,994 89.5%	2,228 9.2%
Total	16,416 67.6%	7,879 32.4%	24,295 100.0%

Source: Figures 8 and 9, pp. 64 and 68 in Beik and Fitch, 1984.

*Row percentages are displayed in the first two columns and column percentages in the third.

The socioeconomic and military characteristics were able to classify 24 percent of the stayers, 98 percent of the nonreturners, but only 11 percent of the reentries correctly. Most stayers, in other words, looked like leavers (combined nonreturners and reentries). Nonreturners consistently looked like nonreturners, and about 90 percent of the reentries also had characteristics similar to the nonreturners.

Numerically, there were about 35 stayers, 44 nonreturners, and 7 reentries in the three base segments when each was divided by districts and by years. These numbers represent the historic average or the approximate current expectations. Additionally, of 2,214 traceable reentries, 568 or 25.6 percent obtained their MP ratings after reentering service.

Although the per district per year numbers are slightly larger than in the two previous CREOs, they do not appear large enough to justify added recruiting or training costs of substantial size.

Engineering support. In the engineering support (ES) segment of 21,704 men, about 20 percent were stayers, 72 percent were nonreturners, and 8 percent were reentries. Table 2.6 shows that classification power was less adequate than the previously discussed CREOs other than for nonreturners. Only 12 percent of the stayers and a little over 6 percent of the reentries could be correctly identified using characteristics present in the DMDC records. Almost 99 percent of the nonreturners were correctly classified.

The average numbers per district per year were 21 stayers, 46 nonreturners, and about 5 reentries. Slightly over 18 percent, 325 of 1788 traceable reentries, obtained their ES ratings after returning to service.

TABLE 2.6

Ability to Classify the Enlistment-Decision Segments of the Engineering Support Occupations

	Correctly Classified	Incorrectly Classified	Total
Stayers	517 12.0%	3,804 88.0%	4,321* 19.9%
Non-returners	15,388 98.7%	199 1.3%	15,587 71.8%
Reentries	115 6.4%	1,681 93.6%	1,796 8.3%
Total	16,020 73.8%	5,684 26.2%	21,704 100.0%

Source: Figures 10 and 11, pp. 74 and 78 in Beik and Fitch, 1984.

*Row percentages are displayed in the first two columns and column percentages in the third.

) Compare an adequate sample of men with relatively long terms of service with an equivalent sample of recent short-term separates.

) Apply discriminant analysis to active-duty and/or recent active-duty records in order to assess the numbers and characteristics of each segment of interest.

) As it classifies, the analysis provides a discriminant score for each individual. This score represents or predicts the extent to which each individual's characteristics are similar to the long-term or short-term personnel analyzed.

) Using the discriminant function obtained from the samples, calculate scores for the additional segment personnel who are nearing the end of their terms of service.

Note that the use of current and/or recent active-duty data should pply numerous and potentially richer variables or characteristics for assification. Obviously, too, such data would contain the units of tive duty or the most recent address for locating individuals in rvice or as they leave. Scores and related information could be made ailable to career counselors in units and transmitted to recruiters in e appropriate locations for those who separate.

The operations technicians provide the best example among the four EOs. Prospectively, they also provide the most likely opportunity for ccess if the suggested system is tested or applied in operation. The 's, it may be recalled, had the greatest proportion of actual stayers, percent, and 29 percent of the leavers exibited characteristics milar to the stayers. The characteristics of the stayers and the milar leavers were generally more favorable than the actual and

policies is a line decision. The limited numbers suggest limited policy-making utility for training and directing recruiting personnel or for targeting advertising, especially since additional costs would be involved.

The Potential for Career Tracking

While the above results do not appear productive for a strategy of identifying segments and targeting the best of these, other options remain. Segment classification applied to individuals caught in the recruiting net by current procedures could be used for improved screening. Better yet, an extension of the research procedure could be applied for combined retention and prior-service recruiting efforts.

The related strategy could involve promoting Navy career paths more extensively than at present. The data strongly imply that service is now used to gain maturity and initial training for civilian occupations. Much of the recruiting procedure may promote that impression. From initial advertising through recruiting and counseling, the segmentation strategy could possibly be improved by greater emphasis on careers. As implied by the present results, the segmentation strategy could monitor performance in such a way that career counselors could select and encourage the retention of trained personnel. At the same time, those who separate could be screened and individually targeted as appropriate to fill CREO shortages.

The steps for this strategy may be listed as follows:

(1) Select segments or categories of CREOs personnel who are nearing the end of their terms of service.

TABLE 2.11

Differential Advantage:
Three Selected Districts in the Southeast Area

	Stayers	Nonreturners	Reentries
Atlanta	+16	-4	-12*
Fort Jackson	+7	-48	+40
San Juan/Coral Gables	+2	+48	-50

Source: Table A-22 in Beik and Fitch, 1984. Interpretation is similar to that of the previous table with the expected or common experience of the southeast area as the basis for comparison.

*Expected values are subtracted from the observed values.

TABLE 2.10

Differential Advantage: Three Selected Recruiting Areas

	Stayers	Nonreturners	Reentries
Northeast	-119	+378	-259*
Southeast	+504	-746	+242
Pacific/Mountain	-115	-131	+247

Source: Table A-20 in Beik and Fitch, 1984. The expected or common experience is that of the nation as a whole.

*The numbers in the table indicate the expected values subtracted from the observed values as previously reported in the Chi-square.

the expected from the observed values using data from the source Chi-square table. The expected values provide a base for comparing the actual numbers. When the total cases are spread among the cells of a Chi-square table in accord with the proportion of enlistments from each area and in accord with the respective proportions of stayers, non-returners, and reentries, we have an "expected" standard of performance.

In Table 2.10, the Northeast area has produced a relatively greater number of nonreturners and relatively fewer stayers and reentries. The Southeast has accounted for relatively more stayers and reentries, but far fewer nonreturners. Reentries have been somewhat more available in the Pacific/Mountain area. Similar current expectations, as previously noted, would depend upon stable conditions for both the base populations and recruiting practices.

The Southeast has been a somewhat favorable area in which to search for stayers and reentries, but each of its districts might similarly be more or less favorable geographic segments for each of the three types of prospects. Table 2.11 represents the results observed in three of the districts where relatively large differences occurred. As might be expected from area results, all three districts had small surpluses of stayers. Fort Jackson produced relatively larger numbers of reentries, and Coral Gables of nonreturners.

Even when period data for the combined CREOs is analyzed, the differential advantages in the respective districts are very small. Recall too, that the more diverse areas and districts were selected for illustration. The differences illustrated are statistically significant; that is, chance variation does not account for the observed differences. Whether the differences are large enough for formulating recruiting

involuntarily. Data are not available for the majority since most were still in service at the end of the eight-year period (FY81).

In other words, the stayers exhibit somewhat better characteristics than the leavers or nonreturners and distinctly better characteristics than the reentries. For potential reenlistment, they might be in greater demand for and adaptable to the civilian economy. On the other hand, the stayers should be well acclimated to Navy life; they acquired more skills and leadership qualities; they have attained higher rank and pay; they tend to have greater responsibility for dependents; and fringe and retirement benefits have potentially accumulated. The ability to screen and persuade prospects appears better for the stayers than for the nonreturners and reentries.

The Small Geographic Differential Advantage

When the four CREO segments were further subdivided into annual, per district, geographic segments, the numbers became very small. Also, the characteristics which distinguished the stayers, etc., were mainly dissimilar in degree rather than in kind among the CREOs. To estimate possible geographical advantages in seeking stayers and reentries (after separation) and nonreturners among the prior service population, the total period-CREO data are combined in the following analysis.

To illustrate quickly, Table 2.10 displays the three recruiting areas which experienced the largest differential advantages and disadvantages in recruiting stayers, nonreturners, and reentries over the period.* The differential advantage is calculated by subtracting

*The complete table of areas and the six tables which display districts within areas are incorporated in the base report as Tables A-20 through A-26.

characteristics by which to compare the stayers as potential prior-service recruiting targets. Although the base numbers in the table are not as large as the nonreturners (the OTs provide an exception), the main questions concern their qualities and possible persuasibility.

With regard to the proportions obtaining a high-school or greater education, Table 2.9 shows quite high percentages for the CREO segments. These percentages range one or two percentage points above those for the leavers or the large nonreturner component of the leavers. The gap between stayers and leavers is much greater for the AFQT scores with the exception of the OTs where no significant difference was observed. For WTs, however, 61.4 percent of the stayers had AFQT scores at or over the 65th percentile while the nonreturners had only 56.9 percent in this upper range. The largest gap was between 58.5 and 43.7 percent for the ESs. In general, somewhat more of the stayers fall in the better educational categories than the leavers or nonreturners and are again better than the reentries.

The paygrade information in Table 2.9 differs from that reported for reentries in Table 2.8. Paygrades are now as of initial entry on the basis that the better qualified or most readily trainable people entered at the higher grades. (Exceedingly few entered over the E03 level.) While 88.5 percent of the OTs entered at the E03 level, the remaining CREOs were all in the 40 percent range. Compared to row three in Table 2.9, the comparable leaver percentages were OT, 69.8; WT, 27.0; MP, 18.3; and ES, 18.0. The differences range from 18.7 percent to 29.0 percent indicating superiority for the stayers.

Quite obviously, few of the stayers would be listed as ineligible to reenlist upon separation, and fewer would have separated

TABLE 2.9

Comparative Qualifications of CREO Stayers*

	Operations Technicians	Weapons Technicians	Main Propulsion	Engineering Support
At Least High School Education[2]	98.8%	88.8%	82.5%	89.6%
At Least 65th AFQT Percentile[2]	86.3% N.S.	61.4%	54.9%	58.5%
At Least E03 Entry Paygrade[2]	88.5%	49.0%	42.8%	47.0%
Base Numbers	5,322	2,875	7,355	4,321

Source: Appendix tables in Beik and Fitch, 1984, and computer Chi-Square tables not incorporated in the base report.

*The stayers are compared directly with the leavers, that is, the combined reentries and nonreturners. Since each cell records a simple percent of the respective totals, the results are quite comparable to Table 8.

[2]Data are as of initial entry.

[3]The symbol N.S. indicates lack of statistical significance.

differences were statistically significant (.01 level or better). Then too, the segment sizes for nonreturners numbered from 4,275 for the OTs to 15,573 for the ESs.

Conversely, the percentages with respect to the three variables reported in Table 2.8 were invariably higher for the nonreturners than for the reentries. About 96.1 percent of the nonreturning OTs had at least a high-school education, for example, as compared to the 92.6 percent for the reentries. Among the MPs, where only 28.8 percent of the reentries fell on or over the 65th AFQT percentiles, 40.6 percent of the nonreturners did so. The percentages for paygrades of EO3 or above were 2.3 to 5.7 percent higher for the nonreturning MPs, WTs, and OTs. The similar percentage for ES nonreturners was also higher by 1.5 percent, but the difference must be considered roughly the same since it was not statistically significant.

Over all, the analysis of the nonreturners suggests that they typically encompass individuals with more favorable characteristics than the reentries. While characteristics available in the DMDC records suggest some potential for screening--variable and variable levels--they do not supply strong implications for persuading nonreturners to rejoin the Navy. After all, the nonreturners have not been persuaded to reenter by past recruiting practices, and apparently they have become successfully established in civilian occupations.

The Stayers

Although the stayers had no break in service for over 72 months, they typically separated and became subject to prior-service recruiting within two years thereafter. Table 2.9 provides some sample

obtained at least a high-school education, GED certificates included. The education-related AFQT percentiles, however, look a bit less optimistic. Although many reentries obtained an E03 or higher paygrade after reentry, the proportions at or above this level look encouraging. The two technical CREOs reported in the table have generally obtained the better qualified recruits.

Unfortunately, the inverse of some of these percentages tends to support the conclusions based on Table 2.7. About 28.6 percent of the MP reentry segment, for example, did not have the equivalent of a high-school education. And 71.2 percent of the same reentry segment fell under the 65th AFQT percentile. The mean AFTQ score, in fact, was only 52.5. Some proportion of this and the other CREO reentry segments may not be thoroughly qualified for the E03 level or sufficiently trainable for the more advanced ratings.

Due to segment size and lack of better qualifications, special targeting of prior-service individuals with characteristics similar to the reentries hardly seems a productive policy. Since qualified individuals should not be rejected, careful screening is warranted when combinations of such indicators as low AFQT scores and reenlistment ineligible codes appear in the records. Continual attention is also needed to make sure that such indicators provide an accurate reflection of individual traits and capacities.

The Nonreturners

In Table 2.7, the nonreturner segments invariably displayed lower percentages of the adverse characteristics than the reentries. With the exception of the adverse-waiver, engineering-support cell, all the

TABLE 2.8

Comparative Qualifications of CREOs

		Operations Technicians	Weapons Technicians	Main Propulsion	Engineering Support
At Least High School Education[1]	Reentries	92.6%	81.1%	71.4%	79.7%
	Nonreturners	96.1%	87.9%	80.7%	88.2%
At Least 65th AFQT Percentile[1]	Reentries	77.8%	46.6%	28.8%	33.3%
	Nonreturners	85.8%	56.9%	40.6%	43.7%
At least EØ Paygrade[2]	Reentries	93.1%	95.9%	94.6%	97.5% N.S.
	Nonreturners	98.8%	98.5%	96.9%	98.0%

Source: Computer Chi-Square tables not incorporated in base report.

*A simple percent of total is recorded in each cell; the percents do not sum either by rows or columns.

[1]At initial entry.

[2]From most recent records, many after reentry.

[3]The symbol N.S. indicates lack of statistical significance.

TABLE 2.7

CREO Deficiencies as Indicated by Military Records

		Operations Technicians	Weapons Technicians	Main Propulsion	Engineering Support
Ineligible To Reenlist	Reentries	49.0%[1]	34.4%	37.9%	33.3%*
	Nonreturners	12.1%	15.4%	22.0%	21.7%
Separated Involuntarily	Reentries	10.9%	5.0%	6.0%	3.2%
	Nonreturners	1.5%	0.8%	1.1%	0.8%
Adverse Waiver at Entry	Reentries	13.6%	10.3%	9.8%	7.8%
	Nonreturners	5.1%	6.9%	7.9%	7.2% N.S.
Base Numbers[2]	Reentries	433	966	2214	1788
	Nonreturners	4275	6942	14701	15573

Source: Appendix tables in Beik and Fitch supplemented by computer printouts.

*A simple percent f total is recorded in each cell; the percents do not sum either by rows or columns.

[1]The symbol N.S. indicates lack of statistical significance.

[2]The numbers of reentries and of nonreturners for each CREO permit approximation of, say, the number of OT reentries who were classified as ineligible to reenlist (.49 x 433 = 212).

It should be noted that the following tables are derived from Chi-square analysis. They deal with the actual numbers of reentries, etc., and the percentages are comparable. This is distinct from previous data where discriminant classification worked against the direct comparison of stayers with the reentries and nonreturners.

The Reentries

While the majority of reentries doubtless exhibited reasonable qualifications, Table 2.7 illustrates that a substantive proportion were rated adversely either upon entry or at the time of separation. From 33 percent of the ESs to 49 percent of the OTs, the reenlistment codes indicated "ineligible to reenlist." Yet, perhaps due to the critical shortages, reenlistment obviously occurred. Many of the reentries had previously separated involuntarily (three to nearly 11 percent), and the majority of these had separated for behavioral shortcomings. At initial entry, almost eight percent of the ESs up to about 14 percent of the OTs were enlisted under waivers which indicated deficiencies.

Doubtless many individuals included in the above statistics had two or possibly all three of the codes indicated. A person separated for use of drugs would also probably be considered ineligible to reenlist. To the extent that no overlap exists in these percentages, the proportion of suspect individuals is likely greater than noted in the top row of the table. The relative importance of the three variables for each of the CREOs is more accurately indicated by discriminant analysis in the source report.

On a more positive note, Table 2.8 reports on three additional characteristics for each of the CREOs. Substantial percentages had

The above analysis, from the operations technicians through the engineering support segments, indicates that classifications power is by far the best for the nonreturners. It is quite good for the OT stayers, but deteriorates for the remaining CREOs, especially the ESs. The ability to identify reentries correctly is quite weak in all cases, and segments of nonreturners who looked like reentries and might therefore be persuasable targets failed to materialize. Any present expectations based on results suggest that the nonreturners present the largest numerical potential. Upon again separating, the stayers are second in size, and the reentries are few whether by total or by CREO segment.

Assuming current reentries would parallel past experience, many would require training (or possibly retraining) for lack of appropriate (or current) ratings. The costs of recruiting prior-service CREO segments must accordingly be weighed against the seriousness of shortages and against other possible sources of manpower. Whether the average annual per district numbers are large enough to support incremental costs of specialized recruiting of target segments is the question. Experience from the FY74-81 period indicates that the four CREO segments are so thinly spread across districts in any typical year that special targeting may not be appropriate.

The Problem of Segment Characteristics

Since the number of CREO prospects on an annual, per district basis appears minimal for special targeting, several salient characteristics or variables which typify the several segments will be summarized quite briefly. The reentries, nonreturners, and stayers will be considered in that order in line with their increase as prospects for reenlistment.

apparent leavers. Nonreturners and reentries would not be classified in the suggested one-stage system.

In the existing data, an array of 10,221 OTs would obviously make a rather extensive table. Instead, a random sample of 30 OTs has been extracted from the total to illustrate the process. Table 2.12 provides the sample which was controlled to represent approximately the same segment proportions as developed in the previous analysis. Long-term segments are indicated by the stayers and short-term by the leavers. There are also actual stayers who have the characteristics of leavers and actual leavers who appear to be stayers.

In the table, the positive scores classify stayers and negative scores leavers. Generally, the higher the positive score, the more likely an individual is to be retained over 72 months by previous definition. Vice versa, the more negative the score, the more likely an individual will separate at or before the 72-month limit. Some misclassifications are of course included, but would not be identified when applied to evaluation of additional groups of individuals.

Numbers close to each other in the array cannot provide a precise distinction. Of the four +0.259 scores predicting stayers, for example, two were actually leavers. Early identification of possible stayers together with retention efforts might persuade these two and others like them to remain in service. For those who separate, the scores identify the most likely candidates for reenlistment while addresses still represent reasonably accurate location information.

Rather than worrying about stayer-leaver segments, the array of scores could be divided into segment-blocks of convenient size. As the

TABLE 2.12

A Sample Array of the Discriminant Scores Which Created the Segments

Observation	Scores Predicting Stayers	Observation	Scores Predicting Leavers
1	2.290	15	-0.308
2	1.733	16	-0.421 S
3	1.486	17	-0.421
4	1.166 L*	18	-0.421
5	0.940	19	-0.534 S
6	0.497	20	-0.534 S
7	0.462 L	21	-0.534
8	0.372	22	-0.647 S
9	0.372	23	-0.647
10	0.259	24	-0.873
11	0.259	25	-1.125 S
12	0.259 L	26	-1.326
13	0.259 L	27	-1.578 S
14	0.043	28	-1.805
		29	-1.918
		30	-1.961

Source: Table 7, p. 95 in Beik and Fitch, 1984. The proportions approximate the results displayed in Figure 4, p. 38 of that report.

*The L indicates an actual leaver misclassified as a stayer, and the S indicates an actual stayer misclassified as a leaver.

equivalent of an index, the blocks could be targeted in succession from the top down to work toward filling requirements.

The above discussion suggests a logical follow-up to the present research. For the OTs, at least, the classification power indicated in the base study looks sufficient to foster retention and reenlistment efforts with reasonable efficiency. Especially with more numerous and improved variables in current data, the approach could be extended to other CREOs. Upon evaluation of the system, policies could be established for its routine application.

After development and testing, a combined career counseling and targeted reenlistment program could integrate information for the Navy's turnover and recruiting problems. Further possibilities exist for combining advertising appeals, recruiting messages, initial placement, training and retraining, and reenlisting quality personnel into a more comprehensive human resource information system.

Conclusions and Source of Recommendations

The previous discussion supplies a basis for understanding a section by section summary of study conclusions. Page citations provide references to concluding paragraphs, and sections preceding these paragraphs contain the supporting evidence. The conclusions, of course, provide the source of the earlier list of recommendations.

Data Quality

* The fact that 4,855 cases (6.8 percent) were lost due to missing variables or characteristics in the records suggests a need for improved data management. A possibly equivalent amount of misrecorded items may

also contaminate the data. Accurate and complete information is needed for policy formation and decisions, for research, and is doubtless critical to the careers of many individuals (p. 19).

Numerical Analysis of Segments

* Among the operations technicians:
  ** Classification power proved sufficient to identify the nonreturners and stayers quite well, but was far less adequate for reentries (p. 22).
  ** When cast on an annual, per district basis, the available numbers of past--and predictably current--reentries appear insufficient to support specialized targeting of the segments, especially if added costs are involved (p. 22).
  ** Any possible savings from reenlisting trained electronic and systems technicians also seem minimal since over half obtained their CREO ratings after rather than before reenlistment (p. 22).
* In varying degrees, these same three conclusions apply to the weapons technicians, the main propulsion, and the engineering support CREOs. In general, the nonreturners present the largest numerical potential; the stayers are second in size and the reentries are few in number. The latter two segments become candidates for reenlistment only after separation (pp. 23-28).
* In that standard advertising and recruiting practices may continue to attract a certain number of well-trained, prior-service individuals, careful screening might help to maintain a viable although sparce source of CREO personnel (p. 23).

Qualitative Analysis

* Targeting of prior-service personnel with characteristics similar to the reentries hardly seems productive since substantive proportions rated low on important qualifications. Various items among the characteristics, however, would facilitate screening (pp. 21, 31).

* Analysis of the nonreturners in the several CREOs indicates that they typically encompass individuals who have more favorable characteristics than the reentries. Unfortunately, the characteristics do not supply strong implications for persuading nonreturners to rejoin the Navy (p. 34).

* The stayers exhibit somewhat better characteristics than the leavers or the nonreturners, and distinctly better than the reentries. Although in greater demand in the civilian economy as well as in the military, their characteristics suggest improved ability to screen and persuade prospects for reenlistment (p. 34-36).

Geographic Analysis

* Even when period data for the combined CREOs is analyzed, the advantage of searching for the stayer and nonreturners segments in particular districts is minimal. When counted at the district level, the marginal numbers of men in these segments is likely to be too small for policy relevance (p. 40).

Career Tracking: Strategy and Systems

* For the operations technicians, at least, the classification power indicated in the analysis looks sufficient to foster combined retention and reenlistment efforts with reasonable efficiency. Especially given

more numerous and improved variables in current data, the strategy could be extended to other CREOs (p. 44).

* Although not inherent in the research data, the strategy comments suggest gradual integration of a personnel information system as guided by further research and test demonstrations. The strategy suggests increased emphasis on career tracking. By combining career counseling with subsequent follow-up of qualified prior-service personnel, one component of a more comprehensive information system could be developed (pp. 40, 44).

A Brief Appendix on Method

The first step was to identify a limited number of CREO segments for analysis. Nine CREO ratings were selected and checked to make sure they were chronically undermanned during a sufficient period of years preceding the research. Reasonably comparable ratings, identified also by primary occupational codes, were grouped into four CREO segments as follows:

1. Operations Technicians
    a. ET (POC 100, 101, 102, 103, 193)
    b. DS (POC 150)
2. Weapons Technicians
    a. GM (POC 633, 644)
    b. FT (POC 104, 113, 121)
3. Main Propulsion
    a. BT and MM (POC 651)

4. Engineering Support

   a. EM (POC 662)

   b. HT (POC 701, 790)

   c. IC (POC 623)

Data were next acquired through channels from the Department of Defense Manpower Data Center. After checking the nature of the records available, a census of men in the four CREO segments was obtained for FY74 through FY81. During this period, new recruits were eliminated from the data set after FY78 on the basis that insufficient time remained for exit-reentry decisions. Reentries were included throughout the total period. Records for a total of 71,678 individuals were available at the start of analysis.

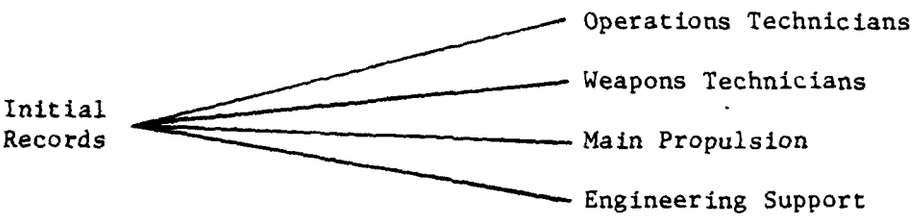
To locate the most useful variables and their potential for distinguishing segments, extensive preliminary analyses were conducted. Frequency distributions and cross classifications were used for this purpose. Univariate and bivariate statistics, however, do not account for sufficient interrelations in the sets of variables, and ultimate dependence was placed on multivariate analysis. Discriminant analysis is a multivariate technique which, in this instance, was applied in two-way form in two successive stages as will be illustrated in the following paragraph.

Figure 2.1 shows that the first stage of segmentation sorted out the four CREOs for separate attention. Each CREO segment was next subdivided into stayers and leavers by the separation-retention decisions made before or at the 72-month definition. The second decision stage occurred as the men reentered the Navy or failed to return. Using the two stages, discriminant analysis located the various socioeconomic or

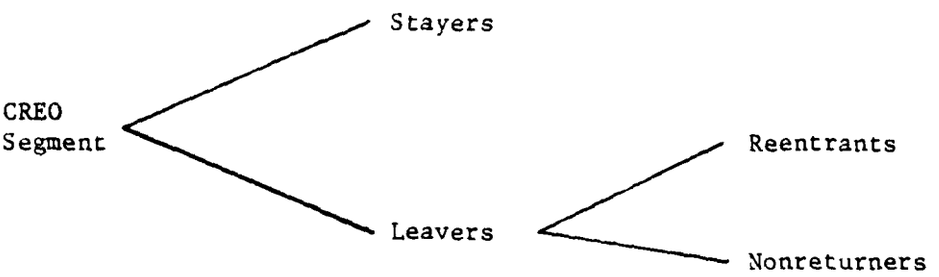
Figure 2.1

Stages of Segmentation

A Segmentation by CREO Groups:



B Further Segmentation by Exit-Reentry Behavior; Base Segments



C Further Segmentation by Demographic, Socioeconomic, and Military Variables; Terminal Segments

military characteristics in the records which permitted stayers to be distinguished from leavers and reentries from nonreturners. Note in the figure that not all could be correctly classified. The leavers were omitted from the tables in order to concentrate on the three segments of direct interest: the stayers, nonreturners, and reentries.

"Segment" may refer to any of the division levels indicated in Figure 2.1. By considering one level at a time, or breakdowns for one CREO at a time, the precise context in which the term is used should be apparent. The nature of the discussion or a look at the accompanying tables should make the level of reference clear.

REFERENCES

Beik, L. L., Mitchell, M. E., and Fitch, S. D. Segmentation of prior-service reentrants in the U.S. Navy: A preliminary analysis (Tech. Rep. ONR 83-3). University Park, PA: The Pennsylvania State University, Institute for Policy Research and Evaluation, April 1983.

Bruning, J. L. and Kintz, B. L. Computational Handbook of Statistics. Glenview, IL: Scott, Foresman and Company, 1968.

Dixon, W. J., Brown, M. B., Engelman, L., Frane, J. W., Hill, M. A., Jennrich, R. I., and Toparek, J. D. (Eds.). BMDP Statistical Software (1981 Ed.). Berkeley: University of California Press, 1981.

Ellison, D. R., Mitchell, M. E., Beik, L. L., Stephenson, S. P., and Fitch, S. D. Separation of prior-service Navy personnel over two- and six-year periods: Fiscal years 1973-1981 (Tech. Rep. ONR 83-2). University Park, PA: The Pennsylvania State University, Institute for Policy Research and Evaluation, April 1983.

Haley, R. I. "Benefit Segmentation," Journal of Marketing, 32 (July 1968), pp. 30-35.

Klecka, W. R. Discriminant Analysis. Beverly Hills, CA: Sage Publications, 1980.

Kotler, P. Principles of Marketing. Englewood Cliffs, NJ: Prentice-Hall, Inc., 1980.

Morrison, D. G. "On the Interpretation of Discriminant Analysis," Journal of Marketing Research, 6 (May 1969), pp. 156-163.

SAS Supplemental Library User's Guide (1980 Ed.). Cary, NC: SAS Institute, Inc., 1980.

Stephenson, S. P., Beik, L. L., Ellison, D. R., and Fitch, S. D. Profile of prior-service accessions to the U.S. Navy: Fiscal Years 1973-1981 (Tech. Rep. ONR 83-1). University Park, PA: The Pennsylvania State University, Institute for Policy Research and Evaluation, April 1983.

CHAPTER 3

CAREER DECISIONS OF NAVY ENLISTED PERSONNEL

Margaret E. Mitchell and Stanley P. Stephenson, Jr.

The purpose of this chapter is to provide U.S. Navy recruiters with an analysis of the factors which affect the military career decisions of men to stay in the Navy as opposed to leaving permanently or leaving and later reentering. Even though this purpose differs from Chapter 2 and the data and definitions differ, the results of the two chapters are quite similar in several respects and thus provide a degree of cross-validation. Further doubt on a deliberate policy of recruiting prior-service persons is found here.

The overall research objective was to examine the career choices of all men who enlisted in the U.S. Navy between 1974 and 1977. Empirical models specific to career choice were developed after considering turnover theory and previous retention studies. Using multiple regression analysis procedures, the following results were obtained. The individual characteristics most strongly associated with:

a. staying in the Navy more than 6 years were from a nonwhite background, had higher entry pay, a high school education, an older entry age, and an occupational job category;
b. leaving the Navy permanently were from a white racial background, had an education beyond high school, a younger age at entry, and a non-occupational job classification; and
c. reentering the Navy with lower entry pay and less than a high school education.

These findings are important for understanding the relationship between individual characteristics and career decisions. They also have important policy implications for the Navy--both for retaining and recruiting Navy personnel.

A Summary of Policy Recommendations

The findings here are very similar to those of Beik in Chapter 2 and confirm many conclusions, although now for a much wider data set.

Again the challenge is raised. Does it make sense to target reentrants for recruiting in order to fill mid-grade petty officer slots? The answer here must be mixed in that it turns on the definition of who is a reentrant. If a potential reentrant has the average characteristics of those studied here, then the Navy should not be encouraged to recruit the person. Clearly, further screens are needed similar to those shown in Chapter 2.

A Review of Prior Studies

The career decisions of Navy personnel are important considerations in the Navy's operation. These decisions effect the turnover rate and, therefore, the quality of the organization.

Turnover can be viewed as having both positive and negative consequences for an organization (Steers and Porter, 1975). However, excessive turnover generally yields negative consequences (Mobley, 1982). Military organizations typically experience high rates of turnover, so the Navy is most concerned with the possible negative consequences of high turnover rates. Thus, the prime consideration in the study of turnover becomes an issue of retaining qualified personnel. Without

satisfactory levels of retention, the Navy is unable to achieve and maintain an optimum force level. This is especially true for certain technical and supervisory positions. The Navy has often expended a significant amount of resources in order to train the people who can fill such positions. The loss of such personnel represents a significant loss to the organization. These issues are especially important in the post-draft era when entrance into the military is voluntary.

Characteristics of individual personnel are related to the varying rates of retention. These characteristics include age, race, level of education, amount of pay, and type of job. Age is one of the variables which most frequently has been related to retention. Although the findings of individual studies vary, age has generally been found to be a positive factor for retention--that is, as age increases, the individual is more likely to stay in the military (Bassett, 1967; Farris, 1967; Goodstadt and Glickman, 1975; Guthrie, Lakota, and Matlock, 1978; Horn and Hulin, 1981; Ley, 1966; LaRocco, Gunderson, and Pugh, 1975; Mobley, Griffith, Hand, and Meglino, 1979; Mobley, Horner, and Hollingsworth, 1978; Price, 1977; Sands, 1978; Wiskoff, Atwater, and Houle, 1978).

The individual's race and education have also been related to retention. Specifically, non-whites are more likely than whites to stay in the military (Eaton and Nogami, 1981; Lockman, 1975; Matthews, 1977; Smith and Kendall, 1980). High levels of education have been associated with a greater likelihood of staying in the military (Greenberg and McConehy, 1977; Guinn, 1977; Lockman, 1975; Matthews, 1977; Plag, Goffman, and Phelan, 1970).

Certain aspects of the individual's military experience (that is, amount of pay and type of job) are related to different likelihoods of

ntion. Greater amounts of pay are associated with less likelihood leaving the military (Federico, Federico, and Lundquist, 1976; ler, 1980; Kohen, 1977). Individuals in less skilled job categories more likely to leave the organization (Wales, 1970; Young, 1971).

This paper addresses the issue of military retention and its relaship to selected demographic characteristics and job experiences. s issue is addressed through the study of three career decisions: staying in the Navy, (2) leaving the Navy permanently, and (3) leavthe service temporarily and then reentering the Navy. These career lsions were analyzed with respect to the characteristics of individpersonnel. These characteristics included sociodemographic data as l as the person's job while in the Navy. It was expected that the elihood of making one of the specific career decisions (that is, ying, leaving, or reentering) would be related to the individual's e, education, age, entry pay, and job classification.

Method

cription of the Population

The population included all enlisted men who entered the Navy for first time during fiscal years 1974 to 1977 (that is, July 1, 1973 June 30, 1977).[a] In addition to excluding officers and women, the ulation also excluded anyone who was in the Navy for less than three ths.

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77 was the cutoff year because DMDC cohort data were available only r FY82 and because we wished to allow recruits to have finished a ll six-year term.

Model 2 (stayers and reentrants). The results of the analyses for
:l 2 are summarized in Table 3.7. These results indicated a
:istically significant relationship ($p < .05$) between the dependent
lable (being a stayer or reentrant) and all independent variables
:pt the variable defined as race-black. Being a stayer (rather than
:entrant) was associated with being a race other than black or white;
ing a high-school education; being older; having entered in a higher
grade; and being in one of the occupational job categories (general
ltary, technical, support, crafts, or mechanical).

Analysis of data for the combined four years resulted in the
lowing specific relationships between the independent variables and
dependent variable (being a stayer or reentrant). Men from racial
cgrounds other than white or black were approximately 15 percent more
:ly than whites and blacks to be stayers. Individuals with an
:ation less than high school were approximately 6 percent less likely
)e stayers, while those with an education greater than high school
: approximately 6 percent less likely to be stayers. Higher entry
grade and an older entry age were each associated with a greater
)ability of being a stayer. Specifically, each increment in pay
:l was associated with approximately a 13 percent increase in the
:lihood of being a stayer. Each additional year of entry age was
)ciated with an approximate increase of 1 percent in the likelihood
)eing a stayer.

Analysis of the job categories indicated that individuals in all
ipational categories (general military, technical, support, craft,
mechanical) had a greater likelihood of being a stayer than those in
non-occupational category. Compared with individuals in other job

Data analysis for the four combinated of fiscal years found the following relationship between specific independent variables and the dependent variable (being a stayer rather than a leaver). Blacks were approximately 12 percent more likely than whites to be stayers. Those classified as Hispanics were approximately 18 percent more likely to be stayers. Men with an education beyond high school were approximately 10 percent less likely than high school graduates to be stayers. Having entered in a higher paygrade and at an older age were each associated with a greater probability of being a stayer. Quantitatively, each increment in entry paygrade was associated with a 9 percent increase in the probability of being a stayer; while each additional year in entry age was associated with a 2 percent increase in the likelihood of being a stayer.

Analysis of the job categories indicated that people in all occupational categories (general military, technical, support, craft, and mechanical) were more likely than those in the non-occupational category to be stayers. Compared with individuals in other job categories, those in the general military, technical, support, craft, and mechanical jobs were, respectively, 17, 49, 51, 33, and 44 percent more likely to be stayers than leavers.

The analysis for the individual years indicated results similar in direction and significance to those for the combinated four years. In only two cases an independent variable was associated with a significant effect for the combined data, but not for data of one of the years. These two cases were the 1977 data for the variable defined as greater than high school education and the 1974 data for the variable defined as general military job.

Table 3.6

Summary[a] of Regression Analyses of Model 1: Stayers Compared with Leavers[b]

ent s	FY74	FY75	FY76	FY77	FY74-77
t	-.370 (-8.96)***	-.426 (-11.48)***	-.387 (-10.26)***	-.297 (-7.14)***	-.393 (-20.38)***
lack	.129 (7.84)***	.115 (7.05)***	.117 (6.74)***	.130 (7.72)***	.121 (14.43)***
ther	.161 (3.76)***	.180 (4.82)***	.246 (6.75)***	.173 (5.94)***	.184 (10.40)***
y	.092 (14.48)***	.099 (16.02)***	.088 (14.33)***	.079 (11.23)***	.090 (28.25)***
n - Less igh School	-.011 (-0.83)	-.008 (-0.59)	-.002 (-0.15)	.011 (0.73)	-.011 (-1.59)
n - Greater igh School	-.082 (-4.33)***	-.117 (-6.64)***	-.195 (-5.64)***	-.051 (-1.35)	-.101 (-9.00)***
e	.021 (10.54)***	.021 (11.67)***	.017 (9.02)***	.012 (5.68)***	.019 (19.05)***
Military	.038 (1.51)	.108 (4.91)***	.286 (12.08)***	.429 (15.36)***	.171 (15.36)***
l Job	.437 (17.54)***	.443 (22.12)***	.533 (29.94)***	.524 (29.75)***	.493 (51.38)***
Job	.467 (17.35)***	.478 (20.99)***	.512 (24.79)***	.529 (26.48)***	.506 (46.38)***
ob	.324 (10.83)***	.270 (9.92)***	.319 (12.60)***	.356 (13.93)***	.330 (25.12)***
al Job	.381 (15.66)***	.412 (21.05)***	.426 (24.41)***	.481 (28.91)***	.435 (46.66)***
	189.43	177.93	177.64	158.88	676.31
	.210	.183	.192	.196	.189
ize	7,867	8,734	8,226	7,169	31,996
Dependent le	.506	.496	.509	.494	.501

n parenthesis indicates T value.

ent variable = 1 if stayer, = 0 if leaver.

p < .05

≤ p < .01

.001

years old at the time of entry. Of the 15,994 reentrants 83.71 percent were white, 84.84 percent entered in paygrade E-1, 68.98 percent had a high-school education, and 87.79 percent were 16-20 years old.

Model values for the job variable differed slightly for the different classifications and different years. Stayers were most likely to have a job in the technical category for all years except 1977 when they were most likely to have a job in the mechanical category. For FY75 and FY76 leavers were most likely to have a job in the mechanical category. For FY74 leavers were most likely to have a job in the general military category, while in 1977 they were most likely to have a job in the non-occupational category. For all years reentrants were most likely to have a job in the mechanical category. More detailed information on the independent variables is presented in Tables 3.4, 3.5, and 3.6, where individual frequencies and percentages are presented for each level of the independent variables.

Regression Analyses

Model 1 (stayers and leavers). The regression analyses for Model 1 are summarized in Table 3.6. The analyses indicated a statistically significant relationship ($p < .001$) between the dependent variable (being a stayer or leaver) and all independent variables except one (education less than high school). The men included in this study were more likely to be stayers than leavers if they were non-white; had entered in a higher paygrade; were older at the time of entry; and were in one of the occupational categories of general military, technical, support, crafts, or technical jobs. Individuals were less likely to be stayers than leavers if they had education beyond high school.

Variable	FY74		FY75		FY76		FY77		FY74-77	
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
Race										
White	3,352	84.73	3,637	84.58	3,481	84.82	2,918	80.30	13,388	83.71
Black	567	14.33	609	14.16	574	13.99	601	16.54	2,351	14.70
Other	37	0.94	54	1.26	49	1.19	115	3.16	255	1.59
Entry Pay Level										
1	3,360	84.93	3,631	84.44	3,502	85.33	3,077	84.67	13,570	84.84
2	149	3.77	207	4.81	236	5.75	285	7.84	877	5.48
3	424	10.72	444	10.33	354	8.63	259	7.13	1,481	9.26
4	13	0.33	5	0.12	7	0.17	9	0.25	34	0.21
5	10	0.25	4	0.09	5	0.12	3	0.08	22	0.14
6	0	0.00	1	0.02	0	0.00	1	0.03	2	0.02
7	0	0.00	7	0.16	0	0.00	0	0.00	7	0.04
8	0	0.00	1	0.02	0	0.00	0	0.00	1	0.01
Education										
Less than high school	1,361	34.40	1,295	30.12	936	22.81	815	22.43	4,407	27.55
High school	2,365	59.78	2,778	64.60	3,115	75.90	2,775	76.33	11,032	68.98
More than high school	230	5.81	227	5.28	53	1.29	45	1.24	555	3.47
Age at Entry										
16-20 years old	3,554	89.84	3,720	86.51	3,592	87.52	3,175	87.37	14,041	87.79
21-25 years old	302	7.63	468	10.88	416	10.14	382	10.51	1,568	9.80
26-30 years old	81	2.05	98	2.28	83	2.02	58	1.60	320	2.00
31-35 years old	16	0.40	13	0.30	11	0.27	16	0.44	56	0.35
Over 35 years old	3	0.08	1	0.02	2	0.05	3	0.08	9	0.06
Job Classification										
General military	889	22.47	916	21.30	809	19.71	313	8.61	2,927	18.30
Technical	880	22.24	933	21.70	930	22.66	734	20.20	3,477	21.74
Support	551	13.93	534	12.42	501	12.21	464	12.77	2,050	12.82
Crafts	243	6.14	240	5.58	238	5.80	238	6.55	959	6.00
Mechanical	1,081	27.33	1,164	27.07	1,142	27.83	1,110	30.54	4,497	28.12
Non-occupational	312	7.89	513	11.93	484	11.79	775	21.33	2,084	13.03
Total	3,956		4,300		4,104		3,634		15,994	

Frequencies and Percentages for Independent Variables Used in Regression Analyses of Leavers

Variable	FY74		FY75		FY76		FY77		FY74-77	
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
Race										
White	3,474	89.31	3,934	89.35	3,690	91.43	3,218	88.70	14,316	89.72
Black	379	9.74	417	9.47	304	7.53	322	8.88	1,422	8.91
Other	37	0.95	52	1.18	42	1.04	88	2.43	219	1.37
Entry Pay Level										
1	3,243	83.37	3,498	79.45	3,158	78.25	2,904	80.04	12,803	80.23
2	147	3.78	188	4.27	255	6.32	252	6.95	842	5.28
3	490	12.60	711	16.15	614	15.21	472	13.01	2,287	14.33
4	4	0.10	3	0.07	4	0.10	0	0.00	11	0.07
5	4	0.10	2	0.05	3	0.07	0	0.00	9	0.06
6	0	0.00	0	0.00	1	0.02	0	0.00	1	0.01
7	2	0.05	1	0.02	0	0.00	0	0.00	3	0.02
8	0	0.00	0	0.00	1	0.02	0	0.00	1	0.01
Education										
Less than high school	1,329	34.16	1,184	26.89	762	18.88	709	19.54	3,984	24.97
High school	2,319	59.61	2,878	65.36	3,197	79.21	2,869	79.08	11,263	70.58
More than high school	24	6.22	341	7.74	77	1.91	50	1.38	710	4.45
Age at Entry										
16-20 years old	3,546	91.16	3,774	85.71	3,468	85.93	3,125	86.14	13,913	87.19
21-25 years old	299	7.69	569	12.92	504	12.49	454	12.51	1,826	11.44
26-30 years old	40	1.03	51	1.16	59	1.46	42	1.16	192	1.20
31-35 years old	4	0.10	9	0.20	5	0.12	7	0.19	25	0.16
Over 35 years old	1	0.03	0	0.00	0	0.00	0	0.00	1	0.01
Job Classification										
General military	1,124	28.89	856	19.44	372	9.22	171	4.71	2,523	15.81
Technical	791	20.33	1,060	24.07	894	22.15	723	19.93	3,468	21.73
Support	325	8.35	372	8.45	383	9.49	377	10.39	1,457	9.13
Crafts	246	6.32	275	6.25	289	7.16	256	7.06	1,066	6.68
Mechanical	1,048	26.94	1,210	27.48	1,204	29.83	1,011	27.87	4,473	28.03
Non-occupational	356	9.15	630	14.31	894	22.15	1,090	30.04	2,970	18.61
Total	3,890		4,403		4,036		3,628		15,957	

Frequencies and Percentages for Independent Variables Used
in Regression Analyses of Stayers

Variable	FY74		FY75		FY76		FY77		FY74-77	
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
Race										
White	3,444	86.60	3,756	86.72	3,615	86.28	2,875	81.19	13,690	83.35
Black	459	11.54	475	10.97	455	10.86	499	14.09	1,888	11.77
Other	74	1.86	100	2.31	120	2.86	167	4.72	461	2.87
Entry Pay Level										
1	2,273	57.15	2,390	55.18	2,330	55.61	2,250	63.54	9,243	57.63
2	160	4.02	162	3.74	246	5.87	224	6.33	792	4.94
3	1,389	34.93	1,716	39.62	1,527	36.44	1,000	28.24	5,632	35.11
4	53	1.33	21	0.48	43	1.03	49	1.38	166	1.03
5	77	1.94	30	0.69	33	0.79	15	0.42	155	0.97
6	18	.45	5	0.12	7	0.17	3	0.08	33	0.21
7	5	.13	3	0.07	2	0.05	0	0.00	10	0.06
8	2	.05	4	0.09	2	0.05	0	0.00	8	0.05
Education										
Less than high school	651	16.37	622	14.36	436	10.41	370	10.45	2,079	12.96
High school	2,861	71.94	3,187	73.59	3,642	86.92	3,062	86.47	12,752	79.51
More than high school	465	11.69	522	12.05	112	2.67	109	3.08	1,208	7.53
Age at Entry										
16-20 years old	3,024	76.04	3,182	73.47	3,118	74.42	2,750	77.66	12,074	75.28
21-25 years old	515	12.95	702	16.21	711	16.97	552	15.59	2,480	15.46
26-30 years old	332	8.35	323	7.46	264	6.30	166	4.69	1,085	6.76
31-35 years old	92	2.31	107	2.47	78	1.86	65	1.84	342	2.13
Over 35 years old	14	.35	17	0.39	19	0.45	8	0.23	58	0.36
Job Classification										
General military	245	6.16	243	5.61	217	5.18	173	4.89	878	5.47
Technical	1,464	36.81	1,740	40.18	1,786	42.63	1,208	34.11	6,198	38.64
Support	608	15.29	599	13.83	600	14.32	602	17.00	2,409	15.02
Crafts	272	6.84	204	4.71	192	4.58	180	5.08	848	5.29
Mechanical	1,337	33.62	1,478	34.13	1,339	31.96	1,320	37.28	5,474	34.13
Non-occupational	51	1.28	67	1.55	56	1.34	58	1.64	232	1.45
Total	3,977		4,331		4,190		3,541		16,039	

model a separate regression analysis was also completed for the combined data for fiscal years 1974 through 1977. In all regression analyses the individual was the unit of analysis.[a]

Results

Descriptive Analysis

The descriptive analysis included frequencies and percentages for each of the independent variables included in the regression analyses. A separate descriptive analysis was computed for each of the three classifications of individuals: stayers, leavers, and reentrants. Data were summarized for each of the fiscal years 1974, 1975, 1976, and 1977 as well as for the total of these four years. These analyses are presented in Tables 3.3, 3.4, and 3.5.

For all three classifications of career decision (that is, stayers, leavers, and reentrants) and for each fiscal year the same modal values were found for the sociodemographic variables. These values were racial background white, paygrade E-1, high school education, and age group 16-20. Of the 16,039 stayers, 85.35 percent were white, 57.63 entered in paygrade E-1, 79.51 percent had high school educations, and 75.28 percent were 16-20 years old at the time of entry. Of the 15,957 leavers 89.72 percent were white, 80.23 percent entered in paygrade E-1, 70.58 percent had high school educations, and 87.19 percent were 16-20

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[a]Service was classified as continuous if there was no break in service or all breaks in service were less than three months.

[†]Models 2 and 3 nearly duplicate the two stages of discriminant analysis in Chapter 2 but with a different set of data.

The dependent variables for the regression analyses were three dichotomous variables, representing different combinations of the individual classifications. The numerical values of these variables are presented in Table 3.2.

Statistical Analysis

A descriptive analysis was completed for each of the independent variables. This analysis included frequencies and percentages.

Ordinary least squares (OLS) regression analysis was used to analyze the data.[b] The basic model was $Y = f(X_1,\ldots,X_6, Z_1,\ldots,Z_5)$. Y represented the specific career decision (staying in, leaving, or reentering the Navy). $X_1,\ldots,X_6$ were sociodemographic characteristics. $Z_1,\ldots,Z_5$ represented the person's job while in the Navy.[c]

The basic model was used to specify three models. Each model used the same independent variables, a different subset of the sample, and a different dependent variable.

Model 1 included stayers and leavers only (Y = 1 if stayer, 0 if leaver).

Model 2 included stayers and reentrants only (Y = 1 if stayer, 0 if reentrant).

Model 3 included leavers and reentrants only (Y = 1 if leaver, 0 if reentrant).

For each of the three models separate regression analyses were completed for the data of each fiscal year (1974, 1975, 1976, and 1977). For each

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[b] Although the dependent variable was dichotomous and the error term was therefore not distributed normally, any problems in using OLS rather than the Logist technique are minimized because of the distribution of the dependent variable (that is, approximately half of the observations in each of the two categories).

[c] The specific independent and dependent variables are described in Table 2.

Table 3.2 (continued)

Variable	Description
Technical job	1 if the job was categorized as technical, otherwise 0.
Support job	1 if the job was categorized as support, otherwise 0.
Crafts job	1 if the job was categorized as a craft, otherwise 0.
Mechanical job	1 if the job was categorized as mechanical, otherwise 0.
Non-occupational category	Reference Group
Dependent variables	All personnel were classified into one of the following categories: stayers, leavers, or reentrants. - Stayers had more than 72 months of continuous[a] service in the military. - Leavers had 72 or fewer months of continuous[a] service in the military. - Reentrants had a break of three or more months in military service. The dependent variables for the regression analyses were three dichotomous variables, representing the three possible combination of two out of three classifications. Model 1: 1 if the person was categorized as a stayer, 0 if a leaver. Model 2: 1 if the person was categorized as a stayer, 0 if a reentrant. Model 3: 1 if the person was categorized as a leaver, 0 if a reentrant.

[a]Service was classified as continuous if there was no break in service or all breaks in service were less than three months.

Table 3.2

Description of Variables Used in the Regression Analyses

Variable	Description
Independent Variables - Sociodemographic	
Race - Black	Race data were recoded to 1 if the person was black, 0 if the person was not black.
Race - Other	Race data were recoded to 1 if the person was neither black nor white (Hispanic), 0 if the person was white or black.
Race - White	Reference Group
Entry Pay	Entry pay data were coded as Navy pay classifications: 1 was used for pay grade E-1, 2 for E-2, etc. The higher the pay grade, the greater was the amount of pay.
Education - less than high school	Entry education data were recoded to 1 if the educational level was less than high school, 0 if high school or more.
Education - high school	Reference Group
Education - greater than high school	Entry education data were recorded to 1 if the educational level was greater than high school 0 if high school or less.
Entry age	Entry age data were coded in years to indicate the person's age at time of entry.
Independent variables - jobs	Job data were coded as six classifications which described the person's job while in the Navy. These classifications were: General Military, Technical, Support, Crafts, Mechanical, and Non-occupational. These data were recoded to five dichotomous variables.
General military job	1 if the job was categorized as general military, otherwise 0.

high school, more than high school); and age (age in years). The race and education variables were each recoded to two dichotomous dummy variables. The numerical values of the sociodemographic variables are presented in Table 3.2.

The job data described the individual's job while in the Navy. Each job was exclusively classified into one of the following six categories: general military, technical, support, craft, mechanical, or non-occupational. The first five categories are referred to as occupational classifications. The reference category, referred to as non-occupational, includes general job classifications which require a minimum amount of training. The six job categories were recoded to five dichotomous dummy variables. The numerical values for each variable are presented in Table 3.2.

Dependent Variables

The dependent variables referred to three classifications of individuals: stayers, leavers, and reentrants. Each person was categorized into one and only one of these classifications. These classifications were based on specific behaviors which occurred within particular time limits. Stayers had more than 72 months of continuous[a] service in the military. Leavers had 72 or fewer months of continuous[a] service in the military. Reentrants had a break of three or more months in military service.

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[a]Service was classified as continuous if there was no break in service or all breaks in service were less than three months.

Table 3.1

Number of Individuals in the Population and Sample

	FY74	FY75	FY76	FY77	Total
Population					
Stayers[a]	11,008	11,904	11,974	8,431	43,317
Leavers[b]	59,804	65,948	61,400	58,137	245,289
Reentrants[c]	3,956	4,300	4,104	3,634	15,994
Total	74,768	82,152	77,478	70,202	304,600
Sample					
Stayers[a]	3,977	4,331	4,190	3,541	16,039
Leavers[b]	3,890	4,403	4,036	3,628	15,957
Reentrants[c]	3,956	4,300	4,104	3,634	15,994
Total	11,823	13,034	12,330	10,803	47,990

[a]Stayers had more than 72 months of continuous service in the military.

[b]Leavers had 72 or fewer months of continuous service in the military.

[c]Reentrants had noncontinuous military service--that is, a break of more than three months in the military.

The number of individuals for each fiscal year (FY) was 74,768 for FY74, 82,152 for FY75, 77,478 for FY76, and 70,202 for FY77. Thus, a total of 304,600 enlisted men were included in the population.

Description of the Sample

A random sample was drawn for each fiscal year. The sample was drawn separately within each year for three classifications of personnel: stayers, leavers, and reentrants. Different sampling proportions were used for each classification so that for each year the number of observations was approximately equal for each classification. The sample of 47,990 men included 11,823 men who entered in FY74, 13,034 who entered in FY75, 12,330 who entered in FY76, and 10,803 who entered in FY77. The number of observations in the sample is presented in Table 3.1 for each classification and each fiscal year.

Procedure

The data were obtained from the Defense Manpower Data Center (DMDC) in Monterey, California. These data included the official data which were recorded for members of the Navy. The data represented the most up-to-date information available as of May 1983.

Independent Variables

Two types of independent variables were used: sociodemographic data and Navy job data. The sociodemographic data were recorded at the time of entry into the Navy. These data included race (white, black, or other); entry pay (eight levels corresponding to each of the pay grades E-1 through E-8); highest education obtained (less than high school,

Table 3.7

Summary[a] of Regression Analyses of Model 2: Stayers Compared with Reentrants[b]

Independent Variables	FY74	FY75	FY76	FY77	FY74-77
Intercept	-.168 (-3.99)***	-.270 (-7.20)***	-.209 (-5.39)***	-.217 (-5.14)***	-.229 (-11.62)***
Race - Black	.029 (1.88)	.033 (2.24)*	-.017 (-1.15)	-.001 (-0.09)	.011 (1.47)
Race - Other	.150 (3.42)***	.187 (5.08)***	.208 (5.86)***	.094 (3.35)***	.149 (8.65)***
Entry Pay	.115 (17.48)***	.121 (19.62)***	.146 (23.10)***	.128 (17.29)***	.127 (38.82)***
Education - Less than High School	-.075 (-5.89)***	-.052 (-4.19)***	-.062 (-4.48)***	-.062 (-4.10)***	-.063 (-9.43)***
Education - Greater than High School	-.051 (-2.61)**	-.040 (-2.12)*	-.103 (-2.81)**	-.053 (-1.34)	-.055 (-4.71)***
Entry Age	.011 (5.75)***	.014 (7.79)***	.009 (4.54)***	.008 (3.84)***	.011 (11.17)***
General Military Job	.058 (2.11)*	.082 (3.59)***	.091 (3.83)***	.260 (9.96)***	.117 (9.82)***
Technical Job	.365 (13.87)***	.419 (19.61)***	.435 (20.18)***	.465 (23.73)***	.431 (39.91)***
Support Job	.319 (11.53)***	.361 (15.56)***	.401 (16.99)***	.453 (21.10)***	.391 (33.44)***
Crafts Job	.288 (9.12)***	.252 (8.80)***	.296 (10.22)***	.327 (11.84)***	.301 (21.04)***
Mechanical Job	.345 (13.33)***	.385 (18.37)***	.365 (17.03)***	.419 (22.38)***	.387 (36.64)***
F Ratio	147.04	188.36	193.74	134.68	652.16
r^2	.170	.194	.205	.171	.183
Sample Size	7,933	8,631	8,294	7,175	32,033
Mean of Dependent Variable	.501	.502	.505	.493	.501

[a] Value in parenthesis indicates T value.

[b] Dependent variable = 1 if stayer, = 0 if leaver.

* $.01 \leq p < .05$

** $.001 \leq p < .01$

*** $p < .001$

categories, those in the general military, technical, support, craft, and mechanical job categories were more likely to be stayers than reentrants--respectively, 12, 43, 39, 30, and 39 percent more likely.

The analyses for the data of individual years produced results that were similar in direction and significance to those for the combinated four years. Only two exceptions to this similarity were noted. In the 1975 data there was a significant effect for one independent variable (race-black) which was not found for the combined data. In the 1975 data, blacks were approximately 3 percent more likely than non-blacks to be stayers. In the 1977 data the effect for one independent variable (education greater than high school) was not significant even though it was significant for the combined data.

Model 3 (leavers and reentrants). The results of the analyses of Model 3 are reported in Table 3.8. These results indicated a statistically significant relationship ($p < .05$) between the dependent variable (leaving or reentering) and all the independent variables. Being a leaver (rather than a reentrant) was associated with being non-white, having an education of high school or more, being younger at the time of entry, having entered in a higher paygrade, and being in the non-occupational job category.

Analysis of data for the combined four years revealed the following specific relationships between the dependent variable (leaving or reentering) and the independent variables. Blacks were approximately 14 percent less likely than non-blacks to be leavers. Individuals from racial backgrounds other than black or white were approximately 5 percent less likely to be leavers. Men with educations less than high school were approximately 4 percent less likely to be leavers. Those

Table 3.8

Summary[a] of Regression Analyses of Model 3: Leavers Compared with Reentrants[b]

Independent Variables	FY74	FY75	FY76	FY77	FY74-77
Intercept	.773 (12.70)***	.647 (11.78)***	.675 (12.45)***	.611 (10.80)***	.680 (24.14)***
Race - Black	-.116 (-6.63)***	-.107 (-6.33)***	-.161 (-9.15)***	-.179 (-10.24)***	-.135 (-15.56)***
Race - Other	-.009 (-0.16)	-.025 (-0.52)	-.064 (-1.25)	-.083 (-2.35)*	-.053 (-2.29)*
Entry Pay	.025 (2.66)**	.033 (4.01)***	.068 (8.04)***	.057 (5.89)***	.046 (10.29)***
Education - Less than High School	-.040 (-3.05)**	-.036 (-2.83)**	-.054 (-3.89)***	-.069 (-4.63)***	-.038 (-5.67)***
Education - Greater than High School	.040 (1.52)	.082 (3.41)***	.063 (1.39)	-.054 (-1.00)	.042 (2.72)**
Entry Age	-.012 (-3.87)***	-.005 (-1.87)	-.004 (-1.24)	-.002 (-0.72)	-.006 (-3.96)***
General Military Job	.026 (1.17)	-.073 (-3.86)***	-.338 (-17.56)***	-.247 (-9.83)***	-.125 (-12.88)***
Technical Job	-.093 (-3.99)***	-.063 (-3.32)***	-.198 (-11.15)***	-.124 (-7.00)***	-.124 (-13.14)***
Support Job	-.176 (-6.83)***	-.160 (-7.14)***	-.219 (-10.41)***	-.138 (-6.69)***	-.180 (-16.41)***
Crafts Job	-.051 (-1.73)	-.049 (-1.85)	-.126 (-5.05)***	-.101 (-4.03)***	-.088 (-6.67)***
Mechanical Job	-.064 (-2.90)**	-.069 (-3.78)***	-.162 (-9.71)***	-.134 -8.43)***	-.112 (-12.75)***
F Ratio	15.52	13.50	46.78	26.13	67.56
r^2	.021	.017	.060	.038	.023
Sample Size	7,846	8,703	8,140	7,262	31,951
Mean of dependent variable	.496	.506	.496	.499	.499

[a]Value in parenthesis indicates T value.

[b]Dependent variable = 1 if leaver, = 0 if reentrant.

* $.01 \leq p < .05$

** $.001 \leq p < .01$

*** $p < .001$

with educations beyond high school were approximately 4 percent more likely to be leavers. Higher entry paygrade and younger entry age were each associated with a greater likelihood of being a leaver. Each increment in entry paygrade was associated with approximately a 5 percent greater likelihood of being a leaver. Each additional year in entry age was associated with approximately a 1 percent decrease in the probability of being a leaver.

Data on job categories indicated that men in the non-occupational category were more likely to be leavers than those in the occupational categories. Compared with individuals in other job categories, those in each of the occupational categories were less likely to be leavers than reentrants. These reduced likelihoods were, respectively, approximately 13, 12, 18, 9, and 11 percent for the job categories general military, technical, support, craft, and mechanical.

The data analyses for individual years produced results which generally were similar in direction and significance to those found for the combined four years. Exceptions to this similarity were found for five independent variables. For certain years a statistically significant result was not found for specific variables even though the corresponding effect was significant for the combined data. This absence of statistical significance was found for the following independent variables for the analysis of the indicated years: race - other (1974, 1975, 1976); education greater than high school (1974, 1976, 1977); entry age (1975, 1976, 1977); general military job (1974); and crafts job (1974, 1975).

Discussion

The results of these analyses indicated that the selected career decisions (that is, staying in, leaving permanently, or leaving temporarily) were associated with different characteristics of the personnel included in this study. The results were also consistent with prior studies including that presented in Chapter 2.

Consistent differences were found for the sociodemographic variables in career decisions. Compared with non-blacks, blacks were the least likely to leave the military permanently. Compared with blacks and whites, men from other racial backgrounds were most likely to stay in the Navy permanently and least likely to leave permanently. Compared with non-whites, whites were most likely to leave the Navy permanently. Compared with people who had at least a high-school education, those with less than a high-school education were most likely to leave the military temporarily and reenter the Navy. Compared with people who had a high-school education or less, those with education beyond high school were most likely to leave the Navy permanently and least likely to stay in the Navy permanently. Older individuals (at time of entry) were most likely to stay in the Navy permanently and least likely to leave permanently. This result is consistent with those studies cited previously, especially those by Mobley.

Entry pay was also associated with specific career decisions. Individuals who entered at higher pay grades were most likely to stay in the Navy permanently and least likely to leave the service temporarily and reenter the Navy. This result is also consistent with prior studies.

Specific differences were associated with the person's job category. Those who were in one of the occupational categories (general military, technical, support, crafts, or mechanical) were most likely to stay in the Navy permanently and least likely to leave the military permanently.

Thus, the individual characteristics most strongly associated with staying in the Navy permanently were non-white racial background, higher entry pay, a high-school education, older entry age, and an occupational job category. The individual characteristics most strongly associated with leaving the Navy permanently were white racial background, education beyond high school, younger age at entry, and a non-occupational job classification. The individual characteristics most strongly associated with reentering the Navy were lower entry pay and education less than high school.

These findings are important for understanding the relationship between individual characteristics and career decisions. They also have important policy implications for the Navy--both for retaining and recruiting Navy personnel.

The findings here are very similar to those of Beik in Chapter 2 and confirm many conclusions, now for a much wider data set.

Again the challenge is raised. Does it make sense to target reentrants for recruiting in order to fill mid-grade petty officer slots? The answer here must be mixed in that it depends on defining who qualifies as a reentrant. If a potential reentrant has the average characteristics of those studied here, then the Navy should not be encouraged to recruit the person. Clearly, further screens are needed like those shown in Chapter 2.

REFERENCES

Basset, G. A. A study of factors associated with turnover of exempt personnel. Crotonville, NY.: Behavioral Research Service, General Electric Company, 1967.

Eaton, K., and Nogami, G. Y. Army male and female attrition. In H. Wallace Sinaiko (Ed.), Military personnel attrition and retention research in progress. Washington, D.C.: Smithsonian Institution, pp. 45-56.

Farris, G. F. A predictive study of turnover. Personnel Psychology, 24 (1971), pp. 311-328.

Federico, J. M., Federico, P., and Lundquist, G. W. Predicting women's turnover as a function of extent of met salary expectations and biodemographic data. Personnel Psychology, 29 (1976), pp. 559-566.

Goodstadt, E., and Glickman, A. S. The current status of enlisted attrition in the U.S. Navy and in the U.S. Marine Corps and the search for remedies. Washington, D.C.: American Institutes for Research, 1975. AIR-54500-11/75-FR.

Greenberg, M. G., and McConeghy, G. Exploratory development research of U.S. Navy-Marine Corps personnel - Phase I. In H. Wallace Sinaiko (Ed.), First-term enlisted attrition. Washington, D.C.: Smithsonian Institution, 1977, pp. 204-218.

Guinn, N. USAF attrition trends and identification of high-risk personnel. In. H. Wallace Sinaiko (Ed.), First-term enlisted attrition, Washington, D.C.: Smithsonian Institution, 1977, pp. 360-381.

Guthrie, R. V., Lakota, R. A., and Matlock, M. W. Voluntary release pilot program: Effects on attrition of general detail personnel. San Diego, CA: Navy Personnel Research and Development Center, 1978. NPRDC TR 78-27.

Horn, P. W., and Hulin, C. L. A competitive test of the prediction of reenlistment by several models. Journal of Applied Psychology, 66 (1981), pp. 23-29.

Kissler, G. D. First-term Navy attrition research: A study of ongoing and future research directions. Center for Naval Personnel Research and Development, San Diego, CA, 1980. NPRDC Technical Note 81-2.

Kohen, A. I. Job changing behavior of young men in the civilian labor market. In H. Wallace Sinaiko (Ed.), First-term enlisted attrition. Washington, D.C.: Smithsonian Institution, 1977, pp. 219-231.

La Rocco, M., Gunderson, E. K., and Pugh, W. M. Prediction of reenlistment: A discriminant analysis approach. San Diego: Naval Health Research Center, 1975, ADA 010 147.

Ley, R. Labor turnover as a function of worker differences, work environment, and authoritarianism of foremen. Journal of Applied Psychology, 50 (1966), pp. 497-500.

Lockman, F. Chances of surviving the first year of service: A new technique for use in making recruiting policy and screening applicants for the Navy. Arlington, VA: Center for Naval Analysis, 1975. CNS 1068.

Matthews, W. T. Quality of Marine test scores, personal data, and performance. In H. Wallace Sinaiko (Ed.), First-term enlisted attritions, Washington, D.C.: Smithsonian Institution, 1977, pp. 419-474.

Mobley, W. H. Intermediate linkages in the relationship between job satisfaction and employee turnover. Journal of Applied Psychology, 62 (1977), pp. 237-240.

Mobley, W. H., Horner, S. O., and Hollingsworth, A. T. An evaluation of precursors of hospital employee turnover. Journal of Applied Psychology, 63 (1978), pp. 408-414.

Mobley, W. H., Griffeth, R. W., Hand, H. H., and Meglinc, B. M. Review and conceptual analysis of the employee turnover process. Psychological Bulletin, 86 (1979), pp. 493-522.

Mobley, W. Employee turnover: Causes, consequences, and control. London: Addison-Wesley Publishing Company, 1982.

Plag, J. A., Goffman, J. M., and Phelan, I. D. Predicting the effectiveness of new mental standards enlistees in the U.S. Marine Corps, TR 71-42. San Diego, CA: Navy Medical Neuropsychiatric Research Unit, 1970.

Price, J. L. The study of turnover. Ames, IA: Iowa State University Press, 977.

Sands, W. A. Enlisted personnel selection for the U.S. Navy. Personnel Psychology, 31 (1978), pp. 63-70.

Smith, J. V., and Kendall, W. A. Personal, situational, and organizational determinants of Navy enlisted attrition. Monterey, CA: Naval Postgraduate School Thesis, 1980.

Steers, R. M., and Porter, L. W. Motivation and work behavior. New York: McGraw-Hill, 1975.

Wales, T. J. Quiet roles in manufacturing industries in the United States." Canadian Journal of Economics, 3 (1970), pp. 123-139.

Wiskoff, M. F., Atwater, D. C., Houle, M. M., and Sinaiko, H. W. Enlisted first-term attrition: Literature review and discussion. A report presented to the Technical Panel UTP-3 (Military Manpower Trends) of The Technical Cooperation Program (TTCP), Montreal, Canada (June 16-21, 1980).

Young, A. Demographic and ecological models for manpower planning. In D. J. Bartholomew and B. R. Morris (Eds.), Aspects of manpower planning. London: English University, 1971.

CHAPTER 4

WAGE GROWTH OF NAVY ENLISTED PERSONNEL

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This is a descriptive, empirical study in which determinants of paygrade changes are estimated for all U. S. Navy enlisted men who entered during FY74 to FY77. Paygrade changes are considered for the first tour of duty.

This chapter is divided into four sections. Background issues are considered in the first section after the summary sections. Data collection and processing are described in the next section. Empirical results are next presented and conclusions listed.

The Chapter in Brief

There are two reasons for this analysis: first, a general desire to examine what has happened in the past in order to better develop and implement a military personnel policy; and, second, a specific desire to examine the relative pay growth of selected subgroups like blacks, people in certain occupations, and those who later remain continuously or interrupt their military career. No prior theoretical or empirical research was found on this topic.

Various factors related to the change in monetary compensation of Navy personnel were studied. Compensation change was measured by change in paygrade. Lower levels of initial paygrade were associated with greater increases in paygrade. The average increase in paygrade for

hose entering at the E-1 paygrade was 2.1 paygrades. For E-2 and E-3 ntrants this paygrade increase was 1.7 and 1.3, respectively.

At greater levels of initial paygrade, the increase in paygrade ssociated with time in service and job classification changed. pecifically, time in service was associated with a smaller increase in aygrade while classification in the trained job classifications was ssociated with a greater increase in paygrade.

Other results indicated that paygrade change was affected by socio- emographic characteristics, time spent in the Navy, and the type of job eld in the Navy. The last result is important since job type is an ndicator of type and marketability of Navy training.

A Summary of Policy Implications

Time in rank and training are primary factors for enlisted Navy ersonnel to advance. At the midgrade petty officer level and beyond oth of these factors plus the availability of openings are important. n view of the shortage of skilled individuals in selected categories, he absence of the draft, and the expected decline in military enlist- ents in the late 1980s, it is especially critical to examine carefully he needs of the Navy and those of the enlisted man who might wish to ake a career in the Navy but confronts an implicit "cap" on the level nd rate of job promotions. This is a main implication of this chapter nd yet further analysis is needed.

Another policy implication concerns reentrants. Those reentrants ho initially entered at E-1 or E-2 paygrade had a significantly greater aygrade after one tour of duty than did otherwise similar men who left he Navy.

This relative advance suggests that reentrants may do relatively well in terms of career development.

Background Issues

While a background section usually provides a theoretical and/or empirical review, this is not quite possible in the present case. To our knowledge no empirical studies exist of military paygrade changes in the post-draft era. Existing theories of wage determination or growth do not apply directly to the Navy. In the first place, the usual static neoclassical model of economists assumes that supply and demand factors directly impact both wage level and change in wage level. This does not appear appropriate. The "price" of a defense unit is difficult to define and measure, and supply is somewhat restricted by the contractual four-year enlistment period. Similarly, industrial relations/collective bargaining models of wage setting are not directly relevant. What does appear to be a more fruitful conceptual framework is that provided by public-sector institutions in which initial pay and subsequent promotions are based on a mix of time in service and relative performance criteria. In the case of the Navy, aspects of the general on-the-job training (OJT) hypotheses and the more recent contract literature both apply.

The general OJT theory of economists Gary Becker (1975) and Jacob Mincer (1962) holds that individuals pay for their own training by accepting a wage during training which is below the market average. After the training the individual must be paid the market wage rate for otherwise similar (but trained) persons, since the individual is free to change jobs. This model of general OJT assumes a complete skill

ıfer from one job to another. In cases of zero skill transfer the
›yer pays for the training by paying the market wage for non-trained
›ns to all employees both during and after training; the employer
recoups the training costs by retaining trained persons. The wage
'epancy between the nearly constant wage paid after the training and
'orker's greater post-training value to the firm is the payoff to
:irm. Because skills cannot be transferred, the worker has little
ıining power. However, should the worker leave after training, the
is unable to recover its "investment" in training.

Contract theory extends these OJT models of (1) wage sett. ıg, (2)
of training incidence, and (3) value to the firm interactions by
.oping rules for the length of post-training retention. By formal
ıformal contracts regarding length of service, the firm is able to
.fy a personnel policy that involves providing costly training
:ams for employees because trainees will be retained for a long
;h period to warrant the training outlay. While the Navy is not a
.t-maximizing private-sector firm, it does exhibit similar behavior.
:xample, it requires persons who wish to specialize in highly tech-
. nuclear fields to agree to a six-year contract as opposed to a
·year enlistment. Various benefits are then tied to successful
.etion of the duty tour.

The Navy's wage setting policy provides an important background for
ıating the change in paygrade. Paygrades of Navy enlisted personnel
: from E-1 (the lowest paygrade) to E-9 (the highest paygrade).
:al pay is determined mainly by educational level at enrollment.
›tion mainly depends on a minimal time in grade (TIG) and passage
ıgh a combination of formal and informal training procedures.

Promotion restrictions increase as paygrade increases. For instance, Congress limits the number of E-5 billets, but does not directly set the number of E-1 or E-3 positions. Informal training standards and on-the-job (OJT) training standards are set implicitly by the following minimal time-in-grade schedule:

Enlisted Paygrade	Minimal Time in Grade
E-1	6 months
E-2	9 months
E-3	9 months
E-4	1 year
E-5	2 years
E-6	2 years

Whether or not these minimal time-in-grade levels imply minimal performance levels is not clear. At higher grades points toward promotion are awarded somewhat less on time-in-service and time-in-grade, and somewhat more on special awards, semi-annual or annual performance appraisals, and the availability of billets.

From these brief and informal comments certain points emerge which guide the empirical research on determinants of change in paygrade during a first term of enlistment.

- Persons at different initial paygrades should be studied separately.
- Time-in-grade, initial education, and occupational choice should be included as covariates in a paygrade change model. It is expected that greater time-in-grade and time-in-service will be associated with more paygrade change.
- More rapid paygrade change will be associated with a choice to remain in (or re-enter) the Navy, rather than leave the Navy.
- Paygrade changes as a function of TIS will be slower at the upper grades.

AD-A157 523 AN EMPIRICAL STUDY TO ENHANCE THE REENLISTMENT PROCESS OF CIVILIAN PERSON..(U) PENNSYLVANIA STATE UNIV UNIVERSITY PARK INST FOR POLICY RESEA.. 2-3

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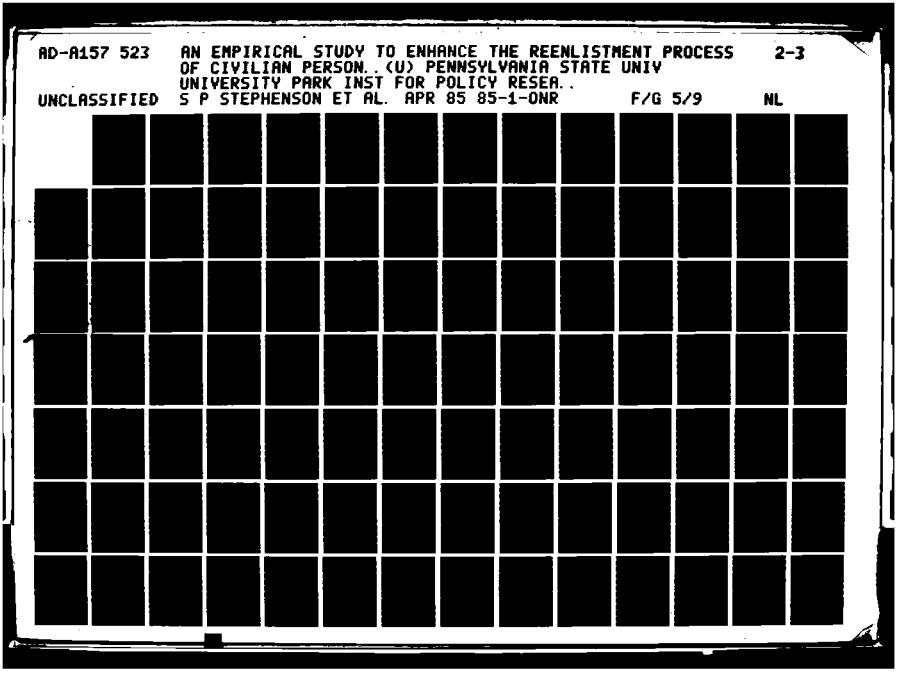

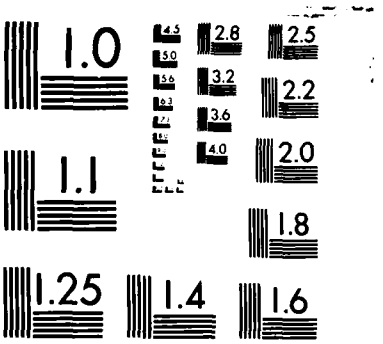

- The more costly the training, the more rapid the rate of paygrade increase.

The goal of the empirical section is to test and examine these hypotheses. In addition, we add covariates to control for education, age, and race--factors which may affect the promotion process via their influence on the individual's motivation, maturity, and job performance (as well as the Navy's perception of these factors).

Method

Description of the Population

The population included all enlisted men who entered the Navy for the first time during fiscal years 1974 to 1977 (that is, July 1, 1973 to June 30, 1977). The population excluded officers, women, those who were in the Navy for less than three months, and individuals who entered the Navy as petty officers (that is, paygrades above E-3).

The number of individuals for each fiscal year (FY) was 72,548 for FY74, 81,631 for FY75, 72,253 for FY76, and 69,122 for FY77. Thus, a total of 298,554 enlisted men were included in the population.

Description of the Sample

A random sample was drawn for each fiscal year. For each fiscal year the sample was drawn separately for three classifications of entry paygrade: E-1 (Seaman recruit), E-2 (Seaman apprentice), and E-3 (Seaman). Different sampling proportions were used for each classification of individuals so that for each year the number of observations was similar for each entry paygrade. A 5 percent sample was used for the E-1 paygrade, 100 percent for the E-2 paygrade, and 25 percent for the

E-3 paygrade. The sample of 40,368 men included 8,407 men who entered in FY74; 10,692 who entered in FY75; 10,918 who entered in FY76; and 10,351 who entered in FY77. The number of observations in the sample is presented in Table 4.1 for each paygrade and each fiscal year.

Procedure

The data were obtained from the Defense Manpower Data Center (DMDC) in Monterey, California. These data included the official data which were recorded for members of the Navy. The data represented the most up-to-date information available as of May 1983.

Independent Variables

Two types of independent variables were used: sociodemographic data and Navy job data. The sociodemographic data were recorded at the time of entry into the Navy. These data included race (white, black, or other); highest education obtained (less than high school, high school, more than high school); and age (age in years). The race and education variables were each recoded to two dichotomous variables. The numerical values of the sociodemographic variables are presented in Table 4.2.

The job data included a measure of the time the person was in the Navy, a classification of the type of job, and a classification of the person's military career.

Time in the Navy was defined as the time between the first permanent record (that is, first entry in the Navy), and the next permanent record for the person. Usually the second permanent record was made at

Table 4.1

Number of Individuals in the Population and Sample

	Sampling Percentage	FY74	FY75	FY76	FY77	Total
Population						
E-1[a]		57,991	62,345	56,304	53,902	230,542
E-2[a]		2,491	3,671	4,488	5,134	15,784
E-3[a]		12,066	15,615	14,461	10,086	52,228
Total		72,548	81,631	75,253	69,122	298,554
Sample						
E-1[a]	(5%)[b]	2,900	3,117	2,815	2,695	11,527
E-2[a]	(100%)[b]	2,491	3,671	4,488	5,134	15,784
E-3[a]	(25%)[b]	3,016	3,904	3,615	2,522	13,057
Total	(15.5%)[b]	8,407	10,692	10,918	10,351	40,368

[a] Paygrade at time of first entry into the Navy.

[b] Sampling percentage for indicated paygrade.

Table 4.2

Description of Variables Used in the Regression Analyses

Variable	Description
Independent Variables	
Career status	Data for FYs 1974-1982 were used to classify all personnel into one of the following categories: stayers, leavers, or reentrants. - Stayers had more than 72 months of continuous[a] service in the military. - Leavers had 72 or fewer months of continuous[a] service in the military. - Reentrants had a break of three of more than 3 months in military service. This classification was used to define two dichotomous variables: stayer and reentrant.
Stayer	1 if the person was categorized as a stayer, 0 if a reentrant or leaver.
Reentrant	1 if the person was categorized as a reentrant, 0 if a stayer or leaver.
Sociodemographic Variables	
Education - greater than high school	Entry education data were recoded as 1 if the educational level was greater than high school, 0 if high school or less.
Education - high school	Reference Group
Education - less than high school	Entry education data were recoded as 1 if the educational level was less than high school, 0 if high school or more.
Race - other	Race data were recoded as 1 if the person was neither black nor white, 0 if the person was white or black.
Race - white	Reference Group
Race - black	Race data were recoded as 1 if the person was black, 0 if the person was not black.
Entry age	Entry age data were coded in years to indicate the person's age at time of first entry into the Navy.

Table 4.2 (continued)

Variable	Description
Years In	The number of years between first entry into the Navy and the next permanent record (usually the time of first reenlisting or separating from the Navy).
Job variables	Job data were coded as six classifications which described the person's job while in the Navy. These classifications were: General Military, Technical, Support, Crafts, Mechanical, and Non-occupational. These data were recoded as five dichotomous variables.
Support job	1 if the job was categorized as support, otherwise 0.
Mechanical job	1 if the job was categorized as mechanical, otherwise 0.
General military job	1 if the job was categorized as general military, otherwise 0.
Technical job	1 if the job was categorized as technical, otherwise 0.
Crafts job	1 if the job was categorized as crafts, otherwise 0.
Nonoccupational job	Reference Group
Year of entry	For the analysis of the combined data set (fiscal year 1974-1977), the final year of entry was used to define three dichotomous independent variables: Entry Year 75, Entry Year 76, and Entry Year 77.
Entry Year 74	Reference Group
Entry Year 75	1 if entered in fiscal year 1975, 0 if entered in fiscal year 1974, 1976, or 1977.
Entry Year 76	1 if entered in fiscal year 1976, 0 if entered in fiscal year 1974, 1975, or 1977.
Entry Year 77	1 if entered in fiscal year 1977, 0 if entered in fiscal year 1974, 1975, or 1976.
Dependent Variable	
Later pay grade	Navy pay grade recorded in the next permanent record after entry (usually the time of first reenlisting or separating from the Navy).

[a]Service was classified as continuous if there was no break in service or all breaks in service were less than three months.

the time of reenlistment or separation from the Navy; however, in some cases this record was made at some other time.

The type of job described the individual's job while in the Navy. Each job was classified into one and only one of the following six categories: general military, technical, support, craft, mechanical, or non-occupational. The general military category included jobs such as gunner's mates, general air crew positions, and small boat operators. The technical category included electronic equipment repairmen, communications and intelligence specialists, medical and dental specialists, and other technical and allied specialists. The support category included functional support, administrative, service, and supply personnel. The crafts category included metal, construction, utility, lithography, and fuel production staff. The mechanical category included aircraft maintenance, automotive, wire communications, electrical, armament maintenance, and shipboard propulsion workers.

The first five categories are referred to as occupational classifications. The last category, referred to as a non-occupational, includes general job classifications which require a minimum amount of training. The six job categories were recoded to five dichotomous variables. The numerical values for each variable are presented in Table 4.2.

The military career status variable classified each person into one and only one of the following three categories: stayers, leavers, or reentrants. The classification was based on specific behaviors which occurred during fiscal years 1974 to 1983. Stayers had more than 72 months of continuous[a] service in the military. Leavers had 72 or fewer

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[a]Service was classified as continuous if there was no break in service or all breaks in service were less than three months.

months of continuous[a] service in the military. Reentrants had a break of three or more months in military service. It should be noted that this classification was based on behavior that occurred during any of the time (fiscal years 1974 to 1983) for which data were available. Therefore, this classification could be based on behavior which occurred after the person's second permanent record--that is, after the time included as the "time in" independent variables and after the time used to compute the dependent variables (later paygrade).

Dependent Variable

The dependent variable was the later paygrade--that is, the paygrade that was recorded in the next permanent record (usually the first reenlistment or separation from the Navy).

Statistical Analysis

A descriptive analysis was completed for each of the independent variables. This analysis included frequencies and percentages.

Ordinary least squares (OLS) regression analysis was used to analyze the data. The basic model was $Y = F(W_1, W_2, X_1, \ldots, X_7, T, Z_1, \ldots Z_5)$.[b] Y was defined as the later paygrade. W_1 and W_2 referred to the military career categories (stayer and reentrant). T was the time variable corresponding to the later paygrade variable. $Z_1, \ldots Z_5$ described the person's job while in the Navy.

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[a] Service was classified as continuous if there was no break in service or all breaks in service were less than three months.

[b] The specific independent and dependent variables are described in Table 4.2.

The basic model was used to specify three models: one for those who entered in paygrade E-1, one for those who entered in paygrade E-2, and one for those who entered in paygrade E-3. For each of the three models separate regression analyses were completed for the data of each fiscal year (1974, 1975, 1976, and 1977). For each model a separate regression analysis was also completed for the combined data for fiscal years 1974 through 1977. In all regression analyses the individual was the unit of analysis.

Results

Descriptive Analysis

The descriptive analysis included frequencies and percentages for each of the independent variables included in the regression analyses. A separate descriptive analysis was computed for each of the three classifications of paygrade: E-1, E-2, and E-3. Data were summarized for each of the fiscal years 1974, 1975, 1976, and 1977 as well as for the total of these four years. These analyses are presented in Tables 4.3, 4.4, and 4.5.

Entry Paygrade E-1. The descriptive analysis of those who entered in paygrade E-1 is reported in Table 4.3. The data for the sociodemographic characteristics indicated that 90.50 percent of the E-1 entrants were 17-20 years old, 87.45 percent were white, and 69.79 percent had completed high school. Also, most entrants (83.27 percent) had careers that characterized them as leavers.

These individuals were in all job classifications. The most common job classification was the mechanical classification, in which 28.33

Table 4.3

Frequencies and Percentages for Independent Variables Used in Regression Analyses
Enlisted Men Who Entered in Pay Grade E-1

Variable	FY74		FY75		FY76		FY77		FY74-77	
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
Career Status										
Stayer	167	5.76	187	6.00	189	6.71	152	5.64	695	6.03
Reentrant	316	10.90	315	10.11	336	11.94	266	9.87	1,233	10.70
Leaver	2,417	83.35	2,615	83.90	2,290	81.35	2,277	84.49	9,599	83.27
Education										
Less than high school	1,113	38.38	979	31.41	640	22.74	637	23.64	3,369	29.23
High school	1,743	60.10	2,084	66.86	2,165	76.91	2,053	76.18	8,045	69.79
More than high school	44	1.52	54	1.73	10	0.36	5	0.19	113	0.98
Race										
White	2,539	87.55	2,740	87.91	2,492	88.53	2,309	85.68	10,080	87.45
Black	331	11.41	336	10.78	270	9.59	316	11.73	1,253	10.87
Other	30	1.03	41	1.32	53	1.88	70	2.60	194	1.68
Age at Entry										
17-20 years old	2,708	93.38	2,819	90.44	2,495	88.63	2,410	89.43	10,432	90.50
21-25 years old	171	5.90	282	9.05	298	10.59	266	9.87	1,017	8.82
26-30 years old	18	0.62	15	0.48	19	0.68	19	0.71	71	0.62
31-35 years old	3	.10	1	0.03	2	0.07	0	0.00	6	0.05
Over 35 years old	0	0.00	0	0.00	1	0.04	0	0.00	1	0.00
Number of Years In										
Up to 1 year	410	14.14	411	13.19	404	14.35	364	13.51	1,589	13.79
1.001 to 2.000 years	467	16.10	540	17.32	415	14.74	340	12.62	1,762	15.29
2.001 to 3.000 years	762	26.28	755	24.22	447	15.88	391	14.51	2,355	20.43
3.001 to 4.000 years	1,042	35.93	985	31.60	1,175	41.74	1,194	44.30	4,396	38.14
4.001 to 5.000 years	162	5.59	329	10.56	287	10.20	362	13.43	1,140	9.89
Over 5 years	57	1.97	97	3.11	87	3.09	44	1.63	285	2.47
Job Classification										
Support	838	28.90	306	9.82	321	11.40	303	11.24	1,215	10.54
Mechanical	477	16.45	845	27.11	825	29.30	779	28.91	3,266	28.33
Military	285	9.83	662	21.24	321	11.40	133	4.94	1,954	16.95
Technical	215	7.41	606	19.44	532	18.90	496	18.40	2,111	18.31
Crafts	817	28.17	208	6.67	177	6.29	186	6.90	786	6.82
Non-occupational	268	9.24	490	15.72	639	22.70	798	29.61	2,195	19.04
Total	2,900		3,117		2,815		2,695		11,527	

percent were categorized. The least common job classification was the craft classification, which accounted for 6.82 percent of these entrants. Each of the other job classification (non-occupational, technical, general military, and support) included, respectively, 19.04, 18.31, 16.95, and 10.54 percent of these individuals.

Since permanent records were recorded at different times, the time at which later paygrade was recorded varied. This time, which was the difference between entry and the next permanent[a] record, was usually three to four years. Of all entrants 38.14 percent had their next permanent record recorded three to four years after entry. The fewest people (2.47 percent) had later paygrade data recorded more than five years after entry. The percentage of entrants categorized in other time categories were 20.43 percent (two to three years after entry), 15.29 (one to two years), 13.79 (less than one year), and 9.89 (four to five years).

E-2 entry paygrade. The descriptive analysis for E-2 entrants is presented in Table 4.4. These data indicated that most of these individuals (86.99 percent) were white, 79.38 percent were aged 17-20 at entry, and 72.55 percent had a high-school education.

Data on military career indicated that most people (81.02 percent) were classified as leavers. The most common job classifications were the mechanical and technical categories, which included 29.05 and 27.04 percent of the entrants, respectively. The least common job classification were the crafts (7.74 percent) and general military (9.09 percent).

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[a]Usually the first reenlistment in or separation from the Navy.

Frequencies and Percentages for Independent Variables Used in Regression Analyses
Enlisted Men Who Entered in Pay Grade E-2

Variable	FY74		FY75		FY76		FY77		FY74-77	
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
Career Status										
Stayer	149	5.98	206	5.61	235	5.24	285	5.55	875	5.54
Reentrant	391	15.70	497	13.54	672	14.97	561	10.93	2,121	13.44
Leaver	1,951	78.32	2,968	80.85	3,581	79.79	4,288	83.52	12,788	81.02
Education										
Less than high school	255	10.24	396	10.79	442	9.85	504	9.82	1,597	10.12
High school	1,000	40.15	1,904	51.87	3,965	88.35	4,582	89.25	11,451	72.55
More than high school	1,236	49.62	1,371	37.35	81	1.81	48	0.94	2,736	17.33
Race										
White	2,126	85.35	3,240	88.26	3,972	88.50	4,393	85.57	13,731	86.99
Black	351	14.09	373	10.16	457	10.18	587	11.43	1,768	11.20
Other	14	0.56	58	1.58	59	1.32	154	3.00	285	1.81
Age at Entry										
17-20 years old	1,989	79.85	2,866	78.07	3,528	78.61	4,147	80.78	12,530	79.38
21-25 years old	463	18.59	749	20.40	882	19.65	899	17.51	2,993	18.96
26-30 years old	34	1.37	48	1.31	71	1.58	81	1.58	234	1.48
31-35 years old	5	0.20	8	0.22	6	0.13	5	0.10	24	0.15
Over 35 years old	0	0.00	0	0.00	1	0.02	2	0.04	3	0.02
Number of Years In										
Up to 1 year	185	7.43	261	7.11	394	8.78	473	9.21	1,313	8.32
1.001 to 2.000 years	268	10.76	492	13.40	554	12.34	487	9.49	1,801	11.41
2.001 to 3.000 years	639	25.65	926	25.23	653	14.55	724	14.10	2,942	18.64
3.001 to 4.000 years	1,094	43.92	1,358	36.99	2,162	48.17	2,583	50.31	7,197	45.60
4.001 to 5.000 years	187	7.51	468	12.75	519	11.56	717	13.97	1,891	11.98
Over 5 years	118	4.74	166	4.52	206	4.59	150	2.92	640	4.06
Job Classification										
Support	376	15.09	540	14.71	561	12.50	664	12.93	2,141	13.56
Mechanical	565	22.68	896	24.41	1,274	28.39	1,533	29.86	4,268	27.04
Military	409	16.42	430	11.71	357	7.96	239	4.66	1,435	9.09
Technical	846	33.96	1,177	32.06	1,375	30.64	1,297	25.26	4,695	29.75
Crafts	183	7.35	262	7.14	341	7.60	435	8.47	1,221	7.74
Non-occupational	112	4.50	366	9.97	580	12.92	966	18.82	2,024	12.82
Total	2,491		3,671		4,488		5,134		15,784	

For most entrants (45.60 percent) there were three to four years between entry and the next permanent record. The least common record time was more than five years (4.06 percent).

E-3 entry paygrade. The descriptive analysis for E-3 entrants is reported in Table 4.5. These data indicated that the most common socio-demographic characteristics were white racial background (92.91 percent), a high-school education (79.67 percent), and entry age between 17 and 20 years (66.95 percent).

Military career data indicated that most people (67.40 percent) would be classified as leavers. Most E-3 entrants had jobs classified as either technical (46.77 percent) or mechanical (30.44 percent). The less common job classifications (general military, support, nonoccupational, and crafts) accounted for, respectively, 7.44, 6.65, 5.78, and 1.92 percent of the entrants.

For most E-3 entrants (18.04 percent) the time between entry and the next permanent record was three to four years. The next most common time frame was more than five years (29.62 percent). Paygrade data for the remaining entrants were recorded two to three years (13.66 percent), one to two years (12.68 percent), four to five years (8.39 percent), or less than one year (7.62 percent) after entry.

Regression Analysis

Entry paygrade E-1. The average later paygrade[a] for men who entered in the E-1 grade was 3.1 grades. Regression analysis was used

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[a]Later paygrade was the paygrade included in the next permanent record after entry (this was usually recorded at the first reenlistment of separation).

individual "pays" for the training by accepting relatively lower pay during training. Otherwise, the firm would not provide the training since the firm needs the positive surplus to offset the positive net training costs. If, after training is completed the individual is free to quit the job and sell his new skills to any firm willing to pay MP_1, then the firm has no incentive to train the person because $W_1 < MP_1$.

The Navy appears to have adapted this model in two ways. First, individuals accept a below-civilian-market wage during training. Second, the Navy enlistment contract calls for a set amount of time--for example, four years of obligated service by the enlistee. Thus insured, the Navy is able to justify direct expenditures for training. Some costs are passed back to the recruit, and the contract reduces this risk to the Navy of recruits quitting just after being trained. After the contract period that encompasses training and post-training periods in the Navy, individuals are free in a third period to seek civilian jobs where $MP_2 = W_2$.

In the case of interrupted military service, a third and fourth phase are introduced. In the third phase some individuals leave the military and others remain. In the fourth phase some who had left the Navy return. The phase three choice to leave or stay depends on the relative expected pay from each option. Assume that the civilian job sequence pays W_c, has a promotion and wage inflation factor $p_c > 0$, and a pension from the Social Security Administration (SSA). The promotion factor reflects wage changes from promotion, productivity changes, wage inflation, and individual unemployment spells. A continued military career choice pays W_m, has a promotion factor $p_m > 0$, and a military pension. By combining phases three and four an interrupted military

Background

The analysis presented here is from the perspective of an individual whom we assume behaves in a manner consistent with the goal of maximizing a lifetime income stream. The choice confronting the individual who strives to meet this goal is to determine which earning stream, civilian or military, is relatively greater. For most individuals the civilian option is clearly preferable. The alternative of a military career is taken by a few persons. However, some people do choose to mix civilian and military careers. The choice of at least one term in the Navy was taken by 80,000 males (excluding officers) annually in the FY74 to FY77 post-draft period. For more than 4 out of 5 of this group, military service was a single period. For others (reentrants) their period of military service was interrupted with a period of civilian life. The reasons that some returned and others did not is related to a theory of general on-the-job training (OJT). We next briefly present this model and use it to derive testable propositions about determinants of time out of the military.

Assume that the Navy operates as a profit-maximizing firm and incurs training costs (T). During training the Navy pays a wage of W_0 and after training pays W_1. The value to the Navy of the individual's work is marginal product value (MP_0) during training and MP_1 after training. The Navy maximizes its "profit" by setting current period net costs, ($W_0 + T - MP.$), equal to the net discounted surplus $(MP_1-W_1)/(1+r)$[a] in period two. In the case of Becker's (1975) OJT model, the

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[a] r refers to the discount rate.

Statistical results, obtained through ordinary least squares (OLS) regression analyses, suggest that a shorter time out of the Navy is associated with several factors including: a greater exit paygrade after a first tour of duty; being Hispanic or black rather than white; and not having graduated from high school when the individual first entered the military. The final section discusses further research goals.

Summary of Policy Implications

If the Navy must recruit from the prior-service community, previous studies in Chapters 2 and 3 have implied that care must be taken to screen candidates by demographic factors. This chapter further suggests "targeting" by how long a prior-service candidate has been out of the military. The issue has a great deal of practical importance in that recruiters may wish to adjust their direct contact marketing efforts according to when most prior-service recruits actually do reenter.

From another perspective, the results here suggest a trend toward shorter and shorter periods of time out of the military before reentering. Because the data base covered FY74 to FY82 and because prior-service recruiting was increased sharply after 1978, one may interpret this empirical result as an indication that such a recruiting policy is having an impact. The regression-adjusted decrease is one year in average time out of the military over a time period which was approximately from 1977 to 1982. This result is very important and, if continued, may continue to further offset the potential decay rate in military skills needed by the Navy, especially in the paygrade range 3 to 4 which are the average exit paygrades of reentrants.

Chapter 5

TIME BETWEEN SEPARATION AND REENTRY FOR NAVY PERSONNEL

Stanley P. Stephenson, Jr. and David A. Macpherson

This paper describes the determinants of time out of service for recent, post-draft cohorts of enlisted Navy men who were reentrants. The topic is important because of Navy concerns for finding ways to meet manning requirements and hold down training costs. For example, a recent study estimated a shortage of over 20,000 petty officers in the Navy. To meet such shortages, prior military personnel are now being considered as a ready source of pre-trained military talent. As a part of an overall evaluative study of the use and recruiting of prior-service personnel, this study examines personal and military factors accounting for variation in time out of the service by those who later reenter--a topic of considerable interest to policy analysts studying recruiting.

The Chapter in Brief

After first presenting a theoretical background which assumes that the individual acts in a way that maximizes net wealth over the work life, we derive testable hypotheses which are consistent with the underlying normative model. These hypotheses are then tested using a sample of all enlisted men who entered the Navy in FY74 to FY77. Before the statistical testing, however, the dependent variable is displayed in several graphs.

REFERENCES

Becker, C. Human capital. New York: National Bureau of Economic Research, 1975.

Mincer, J. On-the-job training: Costs, returns, and some implications, Journal of Political Economy, 70 (1962), pp. 50-79.

The largest increment in paygrade was associated with the occupational variables. Compared with individuals in other job classifications, those in the occupational job categories experienced a greater increase in paygrade. This increase was between .51 and 1.05 paygrades more than that experienced by others. Specifically, these increases were approximately 1.05 paygrades for those in mechanical jobs, 1.01 for crafts jobs, .94 paygrades for technical jobs, .87 for support jobs, and .51 for general military jobs.

As expected, greater time in service was associated with a greater increase in paygrade. Each additional year of service was related to an increase of .34 paygrades.

Table 4.8

Summary[a] of Regression Analyses for Change in Pay Grade[b]
Entry Pay Grade E-3

Independent Variables	FY74	FY75	FY76	FY77	FY74-77
Intercept	1.224 (8.57)***	.923 (8.94)***	1.779 (18.87)***	1.822 (17.04)***	1.530 (29.10)***
Stayer	.297 (9.45)***	.380 (14.60)***	.351 (13.24)***	.423 (11.95)***	.368 (25.31)***
Reentrant	.194 (2.76)*	.074 (1.06)	.114 (1.54)	-.024 (-.25)	.108 (2.84)*
Education - Greater than High School	.130 (3.96)***	.123 (4.35)***	.099 (2.32)*	.125 (2.24)*	.130 (7.17)***
Education - Less than High School	.024 (.30)	-.120 (-1.72)	.006 (.08)	-.138 (-1.21)	-.051 (-1.26)
Race - Other	-.124 (-.90)	-.194 (-1.88)	.056 (.48)	-.099 (-.80)	-.102 (-1.72)
Race - Black	-.250 (-4.24)***	-.293 (-5.65)***	-.171 (-3.49)***	-.110 (-1.88)	-.216 (-7.95)***
Entry Age	.012 (2.82)*	.037 (10.12)***	.015 (3.80)***	.020 (4.29)***	.022 (10.91)***
Years In	.350 (42.72)***	.345 (48.47)***	.345 (45.33)***	.315 (28.65)***	.340 (84.87)***
Support Job	1.438 (11.31)***	1.165 (14.62)***	.813 (12.10)***	.711 (9.85)***	.871 (23.39)***
Mechanical Job	1.53 (12.90)***	1.328 (19.31)***	.992 (19.02)***	.973 (17.56)***	1.048 (34.43)***
General Military Job	.845 (6.87)***	.796 (10.57)***	.708 (10.47)***	.698 (7.33)***	.512 (14.32)***
Technical Job	1.481 (12.60)***	1.235 (18.17)***	.863 (16.64)***	.787 (14.18)***	.937 (31.07)***
Crafts Job	1.389 (10.01)***	1.380 (14.73)***	1.046 (12.34)***	.819 (8.35)***	1.013 (21.84)***
Entry Year 1975	--[c]	--[c]	--[c]	--[c]	-.002 (-.11)
Entry Year 1976	--[c]	--[c]	--[c]	--[c]	.072 (3.99)***
Entry Year 1977	--[c]	--[c]	--[c]	--[c]	.076 (3.77)***
F Ratio	348.81	396.81	335.06	190.61	1021.39
r^2	.602	.570	.547	.497	.556
Sample Size	3016	3891	3615	2522	13057
Mean of Dependent Variable	4.398	4.336	4.360	4.118	4.315

[a] Value in parentheses indicates T value.

[b] Dependent variable is the pay grade recorded in the next permanent record after entry (usually the first reenlistment or separation from the Navy). Therefore, change in pay grade is this later pay grade minus 3.

[c] Not included in this model.

*$.01 \leq p < .05$

**$.001 \leq p < .01$

***$p < .001$

People in support, mechanical, general military, technical, and crafts job showed a paygrade increase which was, respectively, approximately .89, .90, .63, .93, and .92 paygrades greater than that found for other job classifications.

The analyses for data of individual years produced results that were generally similar in direction and significance to the findings for the combined four years. The only exception was found for the independent variable referring to entry age. In this case a statistically significant effect was found for data for the combined years, but not for two individual years (1974 and 1975).

Entry paygrade E-3. The results of the data analysis for individuals who entered in paygrade E-3 are reported in Table 4.8. These people had an average paygrade increase of 1.3 paygrades. A statistically significant ($p < .05$) relationship was found between the dependent variable (later paygrade) and all independent variables except two (that is, education less than high school, and race--other than black or white). A greater increase in paygrade was associated with having an education beyond high school, being non-black, being older at time of entry, being a stayer or reentrant (rather than a leaver), being in one of the occupational categories, and having a longer time in service.

Having an education greater than high school was related to a .13 increase in paygrade, while being non-black was related to a .22 increase in paygrade.

Compared with individuals in other career classifications, stayers and reentrants both evidenced a greater increase in paygrade (approximately .37 and .11 paygrades, respectively).

entry, being a stayer or reentrant (rather than a leaver), and being in one of the occupational job categories. As would be expected, a greater increase in paygrade was also significantly related to the time period used to specify the later paygrade.

Data analysis for the combined four years revealed the following specific relationships between the dependent variable (later paygrade) and specific independent variables. People with an education greater than high school evidenced a paygrade increase of approximately .14 paygrades more than that of people with less education. Those with an education less than high school showed a paygrade increase which was approximately .27 paygrades less than that found for people with a higher education. The paygrade increase for blacks was approximately .22 paygrades less than the paygrade increase for non-blacks. Older age at entry and a longer time frame used to compute paygrade change were both associated with a greater increase in paygrade. Each additional year in entry age was related to an increase of .02 paygrades. Each additional year of time in service was associated with an increase of .51 paygrades.

Different career classifications were associated with varying later paygrades. Compared with reentrants and leavers, stayers evidenced a greater increase in paygrade (approximately .32 more paygrades). Compared with stayers and leavers, reentrants showed a greater increase in paygrade (approximately .20 more paygrades).

Compared with individuals in other job classifications, those in each of the occupation categories had a greater increase in paygrade.

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[a]The direction of the statistical relationship here is estimated as though career classification "causes" paygrade change.

Table 4.7

Summary[a] of Regression Analyses for Change in Pay Grade[b]
Entry Pay Grade E-2

Independent Variables	FY74	FY75	FY76	FY77	FY74-77
Intercept	1.028 (6.04)***	1.076 (8.16)***	.752 (6.29)***	.928 (8.72)***	.800 (12.51)***
Stayer	.353 (8.15)***	.299 (8.35)***	.331 (9.94)***	.274 (8.05)***	.315 (17.44)***
Reentrant	.210 (3.35)***	.216 (4.24)***	.194 (3.76)***	.178 (3.93)***	.199 (7.65)***
Education - Greater than High School	.191 (5.68)***	.124 (4.53)***	.008 (.09)	.101 (.93)	.141 (7.22)***
Education - Less than High School	-.323 (-6.13)***	-.282 (-6.98)***	-.270 (-6.71)***	-.199 (-5.50)***	-.265 (-12.81)***
Race - Other	.069 (.35)	-.112 (-1.26)	.050 (.50)	-.107 (-1.76)	-.077 (-1.73)
Race - Black	-.228 (-5.27)***	-.180 (-4.58)***	-.197 (-5.17)***	-.214 (-6.47)***	-.215 (-11.29)***
Entry Age	-.004 (-.45)	.007 (1.14)	.025 (4.30)***	.022 (4.25)***	.017 (5.45)***
Years In	.506 (38.43)***	.529 (51.74)***	.534 (53.33)***	.450 (43.58)***	.514 (98.38)***
Support Job	1.054 (13.10)***	.880 (17.90)***	.776 (16.12)***	1.047 (24.81)***	.889 (36.20)***
Mechanical Job	1.142 (14.89)***	.900 (19.74)***	.792 (19.07)***	1.020 (27.91)***	.895 (41.05)***
General Military Job	.634 (7.83)***	.492 (9.63)***	.718 (13.82)***	1.091 (18.99)***	.631 (24.14)***
Technical Job	1.132 (14.96)***	.871 (19.36)***	.888 (21.03)***	1.054 (27.82)***	.934 (42.36)***
Crafts Job	1.149 (12.93)***	.848 (14.50)***	.854 (15.56)***	1.069 (22.58)***	.923 (32.63)***
Entry Year 1975	--[c]	--[c]	--[c]	--[c]	.092 (4.73)***
Entry Year 1976	--[c]	--[c]	--[c]	--[c]	.120 (5.74)***
Entry Year 1977	--[c]	--[c]	--[c]	--[c]	.144 (6.96)***
F Ratio	302.94	484.47	512.61	606.08	1516.14
r^2	.614	.633	.598	.606	.606
Sample Size	2491	3671	4488	5134	15784
Mean of Dependent Variable	3.660	3.689	3.709	3.677	3.686

[a]Value in parentheses indicates T value.

[b]Dependent variable is the pay grade recorded in the next permanent record after entry (usually first reenlistment or separation from the Navy). Therefore, change in pay grade is this later pay grade minus 2.

[c]Not included in this model.

*$.01 \leq p < .05$

**$.001 \leq p < .01$

***$p < .001$

The change in paygrade during this initial period of observation was associated with the individual's classifications of his total military career. Of the three classifications (stayer, reentrant, leaver) the least paygrade increase was found for leavers. Stayers evidenced a greater paygrade increase (approximately .45 more paygrades) than reentrants and leavers. Reentrants showed a greater paygrade increase (approximately .24 more paygrades) than stayers and leavers.

Data on job categories indicated that individuals in each of the occupational job categories had a greater increase in paygrade than individuals in other (non-occupational) job categories. These increases were, respectively, approximately .78, .80, .47, .84, and .82 paygrades for individuals in the job categories support, mechanical, military, technical, and crafts.

The analyses of data for individual years produced results similar to those for the combined four years. In all cases the signs of significant relationships were the same as those found for the combined analysis. Two independent variables (education greater than high school and race--other) were associated with statistically significant effects for the combined analysis, but these effects were not significant for the analysis of all individual years.

Entry paygrade E-2. The average later paygrade for those who entered in the E-2 paygrade was 3.7. The factors affecting this change were analyzed through regression analyses, which are presented in Table 4.7. These results indicated a significant relationship ($p < .05$) between the dependent variable and all independent variables except one (that is, race--other). A greater increase in paygrade was associated with having higher education, being non-black, being older at time of

Table 4.6

Summary[a] of Regression Analyses for Change in Pay Grade[b]
Entry Pay Grade E-1

Independent Variables	FY74	FY75	FY76	FY77	FY74-77
Intercept	-.071 (-0.38)	.468 (2.68)*	.238 (1.47)	.343 (1.91)	.195 (2.22)*
Stayer	.445 (9.41)***	.428 (9.07)***	.445 (9.65)***	.471 (9.48)***	.454 (19.10)***
Reentrant	.313 (5.25)***	.193 (3.39)***	.173 (3.02)*	.264 (4.21)***	.243 (8.21)***
Education - Greater than High School	.305 (2.65)**	.075 (.71)	.147 (.61)	-.205 (-.61)	.169 (2.33)*
Education - Less than High School	-.185 (-5.89)***	-.208 (-6.59)***	-.200 (-5.61)***	-.168 (-4.67)***	-.201 (-12.00)***
Race - Other	-.034 (-0.25)	-.145 (-1.22)	-.310 (-2.91)*	-.050 (-.55)	-.145 (-2.65)**
Race - Black	-.223 (-5.06)***	-.232 (-5.25)***	-.237 (-4.85)***	-.166 (-3.66)***	-.221 (-9.70)***
Entry Age	.032 (3.44)***	.023 (2.54)**	.031 (3.71)***	.028 (2.97)*	.029 (6.36)***
Years In	.665 (50.65)***	.610 (51.16)***	.623 (52.26)***	.524 (38.05)***	.617 (101.34)***
Support Job	.918 (14.33)***	.734 (13.18)***	.733 (13.39)***	.864 (15.56)***	.775 (27.61)***
Mechanical Job	.843 (15.82)***	.746 (16.90)***	.698 (15.89)***	1.057 (22.99)***	.795 (35.31)***
General Military Job	.518 (9.23)***	.346 (7.41)***	.584 (11.27)***	1.028 (13.76)***	.472 (19.34)***
Technical Job	.900 (15.39)***	.754 (15.86)***	.773 (15.81)***	1.087 (21.52)***	.836 (33.63)***
Crafts Job	.831 (12.08)***	.689 (10.88)***	.780 (11.73)***	1.165 (17.45)***	.820 (25.22)***
Entry Year 1975	--[c]	--[c]	--[c]	--[c]	.068 (3.52)***
Entry Year 1976	--[c]	--[c]	--[c]	--[c]	.063 (3.11)***
Entry Year 1977	--[c]	--[c]	--[c]	--[c]	.049 (2.35)*
F Ratio	508.48	518.42	502.00	487.31	1617.60
r^2	.696	.685	.700	.703	.692
Sample Size	2900	3117	2815	2695	11527
Mean of Dependent Variable	3.012	3.124	3.199	3.179	3.127

[a] Value in parentheses indicates T value.

[b] Dependent variable is the pay grade recorded in the next permanent record after entry (usually the first reenlistment or separation from the Navy). Therefore, change in pay grade is the later pay grade minus 1.

[c] Not included in this model.

*.01 $\leq$ p < .05

**.001 $\leq$ p < .01

***p < .001

to discern which factors accounted for this change of 2.1 grades. The results of these regression analyses are summarized in Table 4.6. The results indicated a statistically significant relationship ($p < .05$) between the dependent variable and all independent variables. A greater increase in paygrade was associated with being relatively more educated and older at time of entry, being white, and being in one of the occupational (vs. non-occupational) job categories. Greater increase in paygrade was also related to the later career classification of stayers and reentrants.[a] A greater increase in paygrade was also found for those who entered the Navy in the later years. Finally, as would be expected, a greater time in the Navy (for the time period for which data were analyzed) was associated with a greater increase in paygrade.

Analysis of data for the combination of the four fiscal years revealed the following specific relationships between the dependent variable and the independent variables. An education beyond high school was associated with a relative increase of approximately .17 paygrades; whereas an education less than high school was associated with smaller increase in paygrade (approximately .20 paygrades less). The greatest increase in paygrade was found for whites. Compared with non-blacks, blacks evidenced a smaller increase in paygrade (approximately .22 paygrades less). Compared with blacks and whites, members of other races showed a smaller increase in paygrade (approximately .15 paygrades less). For each added year of age, paygrade increased by a slight amount; but the biggest overall effect was for time in service: for each year of TIS, paygrade grew by 0.62 points. Thus, most of the variance for later paygrade can be explained with TIS alone.

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[a]The direction of the statistical relationship here is estimated as though career classification "causes" paygrade change.

That is, Path B will be chosen if Path A < Path B, or

$$\underset{\text{Path A}}{\int_{a}^{45} (W_c \times p_c) e^{-rt}} < \underset{\text{Path B}}{\int_{a}^{b} (W_c \times p_c) e^{-rt} + \int_{b}^{45-c} (W_m' \times p_m') e^{-rt} + \int_{45-c}^{45} (W_c' \times p_c') e^{-rt} + \text{Military Pension Value}}$$

That is, other things being equal, the probability of an interrupted military career (vs. a one-time military period) will increase with the following

- the more the composite wage, (W_c, W_m, W_c) exceeds the pure average civilian wage W_c.
- the more the composite promotion factor (p_c, p_m, p_c) exceeds the pure average promotion factor for a civilian job.
- the greater the military pension value.

the shorter the military, the time between b and a, will be less as

- the difference between W_m and W_c decreases.
- the military pension value increases.
- the relatively slower the civilian promotion factor p_c (vs. p_m).

With these in mind,[a] we would expect that time out of the military would be relatively less for the following groups:

- nonwhites (vs. whites)
- less educated (vs. more educated)
- those with occupational training which lacks a civilian counterpart category
- those with a relatively greater pay when leaving the military

[a] Some verification of these hypotheses also gains support from the analysis presented in Chapters 3, and 4.

- those in military occupational groups which have shown the most rapid military promotion rates

We later test these hypotheses using multiple regression techniques.

Method

Description of the Sample

The population included all enlisted men who entered the Navy for the first time during FY74 to FY77 (that is, July 1, 1973 to June 30, 1977). In addition to excluding officers and women, the population also excluded anyone who was in the Navy for less than three months.

The number of individuals for each fiscal year (FY) was 3,956 for FY74, 4,300 for FY75, 4,103 for FY76, and 3,634 for FY77. Thus, a total of 15,993 enlisted men were included in the population.

A military career status variable was used to classify each person into one and only one of the following three categories: stayers, leavers, and reentrants.[b] Reentrants are the only group studied here.

Procedure

The data were obtained from the Defense Manpower Data Center (DMDC) in Monterey, California were the same population used in Chapter 3.

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[a] Service was classified as continuous if there was no break in service or all breaks in service were less than three months.

[b] This classification was based on specific behaviors which occurred during the fiscal years 1974 to 1983. Stayers had more than 72 months of continuous[a] service in the military. Leavers had 72 or fewer months of continuous[a] service in the military. Reentrants had a break of three or more months in military service.

These data included the official data that were recorded for members of the Navy. The data represented the most up-to-date information available as of May 1983 and were selected so as to allow a tour of military duty of four years to be followed by a three-year civilian period prior to reentering the Navy. Thus we selected persons who first entered in FY74 to FY77.

Independent Variables

Two types of independent variables were used: sociodemographic data and Navy job data. These are shown in Table 5.1 which is nearly identical to Table 2.2 in Chapter 2. The sociodemographic data were recorded at the time of exit from the Navy. These data included race (white, black, or other); exit pay (eight levels corresponding to each of the paygrades E-1 through E-8); highest education obtained (less than high school, high school, more than high school); and age (age in years). The race and education variables were each recoded to two dichotomous dummy variables. The numerical values of the sociodemographic variables are presented in Table 5.2.

The job data described the individual's job while in the Navy. Each job was classified into one and only one of the following six categories: general military, technical, support, craft, mechanical, or non-occupational. The first five categories are referred to as occupational classifications. The last category, referred to as non-occupational, includes general job classifications which require a minimum amount of training. The six job categories were recoded to five dichotomous variables. The numerical values for each variable are presented in Table 5.2 and Table 5.3.

Table 5.1

Description of Variables Used in the Regression Analyses

Variable	Description
Independent Variables	
Sociodemographic Variables	
Education - greater than high school	Entry education data were recoded as 1 if the educational level was greater than high school, 0 if high school or less
Education - high school	Reference Group
Education - less than high school	Entry education data were recoded as 1 if the educational level was less than high school, 0 if high school or more.
Race - Other	Race data were recoded as 1 if the person was neither black nor white, 0 if the person was white or black.
Race - White	Reference Group
Race - Black	Race data were recoded as 1 if the person was black, 0 if the person was not black.
Entry age	Entry age data were coded in years to indicate the person's age at time of first entry into the Navy.
Pay Variables	
Paygrade at exit	Paygrade when leaving the Navy (before reentering)
Job Variables	Job data were coded as six classifications that described the person's job while in the Navy. These classifications were: General Military, Technical, Support, Crafts, Mechanical, and Non-occupational. These data were recoded as five dichotomous variables.
Support job	1 if the job was categorized as support, otherwise 0.

Table 5.1 (continued)

Variable	Description
Independent Variables	
Job Variables (continued)	
Mechanical job	1 if the job was categorized as mechanical, otherwise 0.
General military job	1 if the job was categorized as general military, otherwise 0.
Technical job	1 if the job was categorized as technical, otherwise 0.
Crafts job	1 if the job was categorized crafts, otherwise 0.
Non-occupational Category	Reference Group
Year of Entry	For the analysis of the combined data set (fiscal years 1974-1977), the final year of entry was used to define three dichotomous independent variables: Entry Year 75, Entry Year 76, and Entry Year 77.
Entry Year 74	Reference Group
Entry Year 75	1 if entered in fiscal year 1975, 0 if entered in fiscal year 1974, 1976, or 1977.
Entry year 76	1 if entered in fiscal year 1976, 0 if entered in fiscal year 1974, 1975, or 1977.
Entry year 77	1 if entered in fiscal year 1977, 0 if entered in fiscal year 1974, 1975, or 1976.
Dependent Variable	
Time out of service	Number of days between leaving the Navy and reentering.

Table 5.2

Frequencies and Percentages for Independent Variables Used in Regression Analyses of Time Out

Variable	FY74		FY75		FY76		FY77		FY74-77	
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
Education										
Less than high school	1,361	34.40	1,295	30.12	936	22.81	815	22.43	4,407	27.56
High school	2,365	59.78	2,778	64.61	3,114	75.90	2,774	76.34	11,031	68.97
More than high school	230	5.81	227	5.28	53	1.29	45	1.24	555	3.47
Race										
White	3,352	84.73	3,637	84.58	3,480	84.82	2,918	80.30	13,387	83.71
Black	567	14.33	609	14.16	574	13.99	601	16.54	2,351	14.70
Other	37	0.94	54	1.26	49	1.19	115	3.17	255	1.59
Age at Entry										
17-20 years old	3,554	89.84	3,720	86.51	3,591	87.52	3,175	87.37	14,040	87.79
21-25 years old	302	7.63	468	10.88	416	10.14	382	10.51	1,568	9.80
26-30 years old	81	2.05	98	2.28	83	2.02	58	1.60	320	2.00
31-35 years old	16	0.40	13	0.30	11	0.27	16	0.44	56	0.35
Over 35 years old	3	0.08	1	0.02	2	0.05	3	0.08	9	0.06
Pay Grade at Exit										
1	399	10.09	493	11.47	574	13.99	386	10.62	1,852	11.58
2	174	4.40	195	4.54	167	4.07	107	2.94	643	4.02
3	789	19.94	863	20.07	587	14.31	577	15.88	2,816	17.61
4	1,646	41.61	1,784	41.49	1,882	45.87	1,818	50.03	7,130	44.58
5	869	21.97	923	21.47	874	21.30	743	20.45	3,409	21.32
6 or higher	79	2.00	42	0.98	19	0.46	3	0.08	143	0.89
Job Classification										
General military	889	22.47	916	21.30	809	19.71	313	8.61	2,927	18.30
Technical	880	22.25	933	21.70	930	22.67	734	20.20	3,477	21.74
Support	551	13.93	534	12.42	500	12.19	464	12.77	2,049	6.00
Crafts	243	6.14	240	5.58	238	5.80	238	6.55	959	12.81
Mechanical	1,081	27.33	1,164	27.07	1,142	27.83	1,110	30.55	4,497	28.12
Non-occupational	312	7.89	513	11.93	484	11.80	775	21.33	2,084	13.03
Total	3,956	100.00	4,300	100.00	4,103	100.00	3,634	100.00	15,993	100.00

Table 5.3

Mean Values of Variables Used in Regression Analyses

	FY74 n = 3956	FY75 n = 4300	FY76 n = 4103	FY77 n = 3634	FY74-77 n = 15993
Independent Variables					
Age at Entry[a]	18.58	18.76	18.79	18.85	18.74
Pay at Exit[b]	3.67	3.60	3.58	3.67	3.63
Dependent Variable					
Time Out[c]	800.14	703.74	562.25	429.63	629.00

[a] Mean value of age (in years)

[b] Mean value of paygrade (i.e. 1 = E-1, 2 = E-2, etc.)

[c] Mean value (in days)

In general, the sample can be described as youth who were at most high-school graduates and between 18 and 19 years old when they first joined the Navy; they later left the Navy after a first duty tour with a paygrade of 3.6 and later reentered. The education at enlistment implies an E-1 paygrade initially. When they left, two-thirds had achieved pay E-4 or above.

Dependent Variable

Time out of the military between two enlistment periods is the dependent variable. Recruiters for the Navy have an interest in how long to track a person who has left the Navy. Also, from an investment in training perspective the Navy has an interest in reducing time out of the military for skilled persons in critical areas.

There are several ways to measure the extent of time between duty tours. One method, shown in Table 5.3, simply indicates the arithmetic mean. This shows the average time between tours fell from 800 days to 430 days during a time period which was approximately from 1978 to 1982.

The arithmetic mean is only one measure but it is sharply affected by extreme values and does not convey any distributional information. For example, one might like to know what proportion of reentrants returned within one year after leaving. Similarly, one might like to know the efficacy of various financial incentive plans tied to reentry time points. The first of these issues are examined here in Figures 5.1 to 5.4 and in Tables 5.4 to 5.7. The focus in both the figures and tables is on the cumulative frequency distribution. From this, we see that the time out distribution is skewed and appears to be shifting leftward over time. Some of this shift and the change in mean time out

Frequency Bar Chart

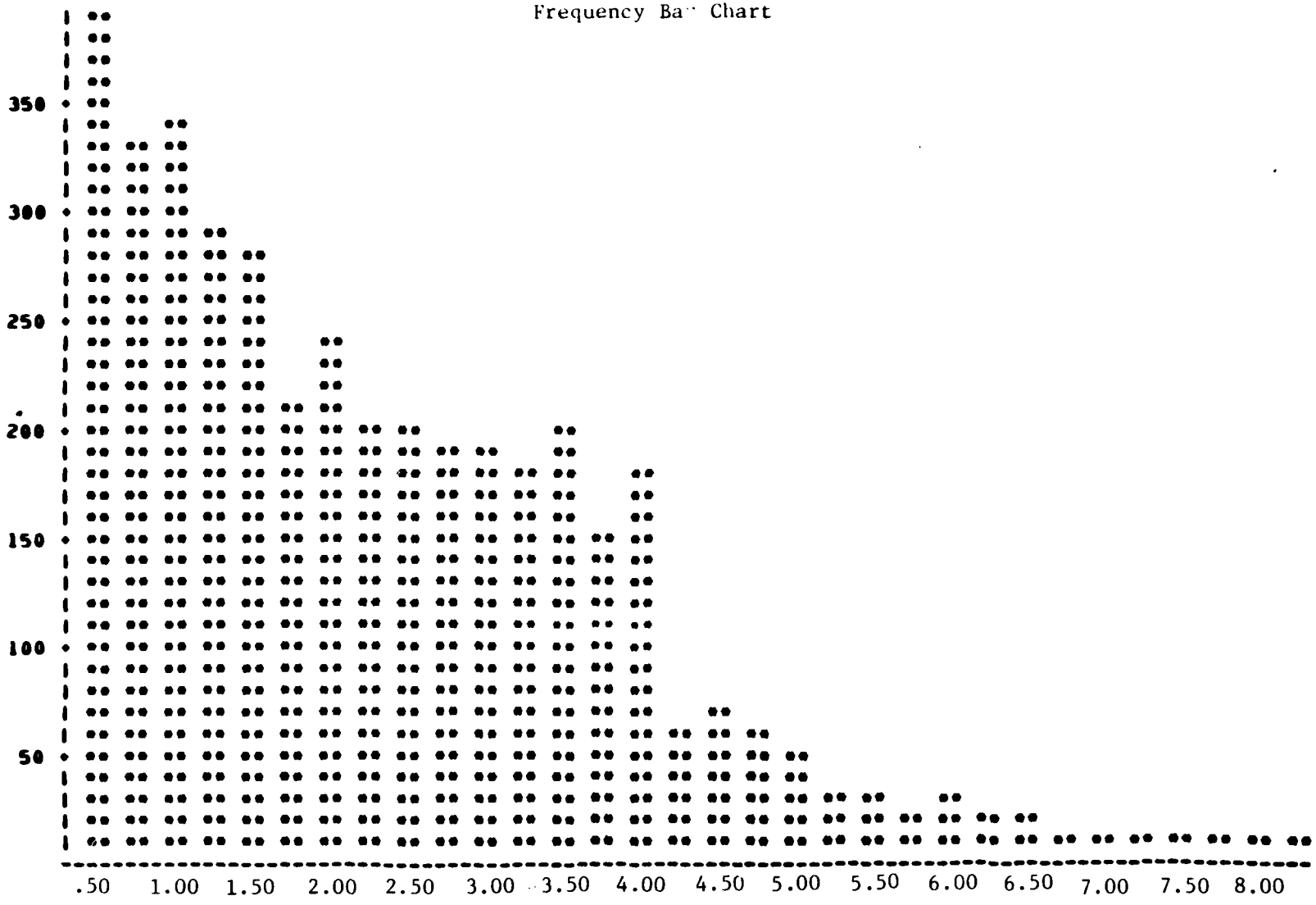

Figure 5.2 Years Out of Service (1975 Cohort)

Frequency Bar Chart

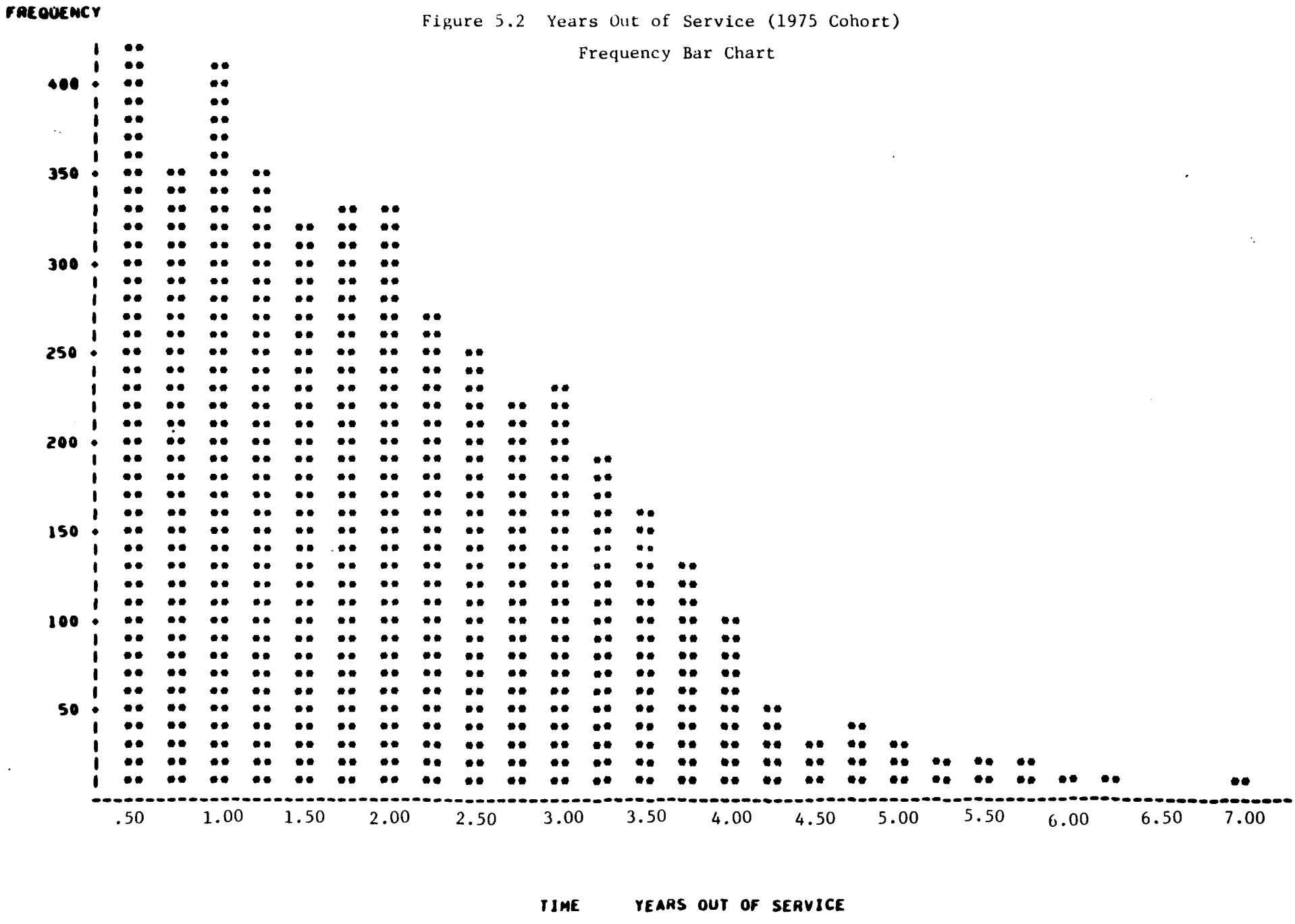

Figure 5.3 Years Out of Service (1976 Cohort)

Frequency Bar Cha

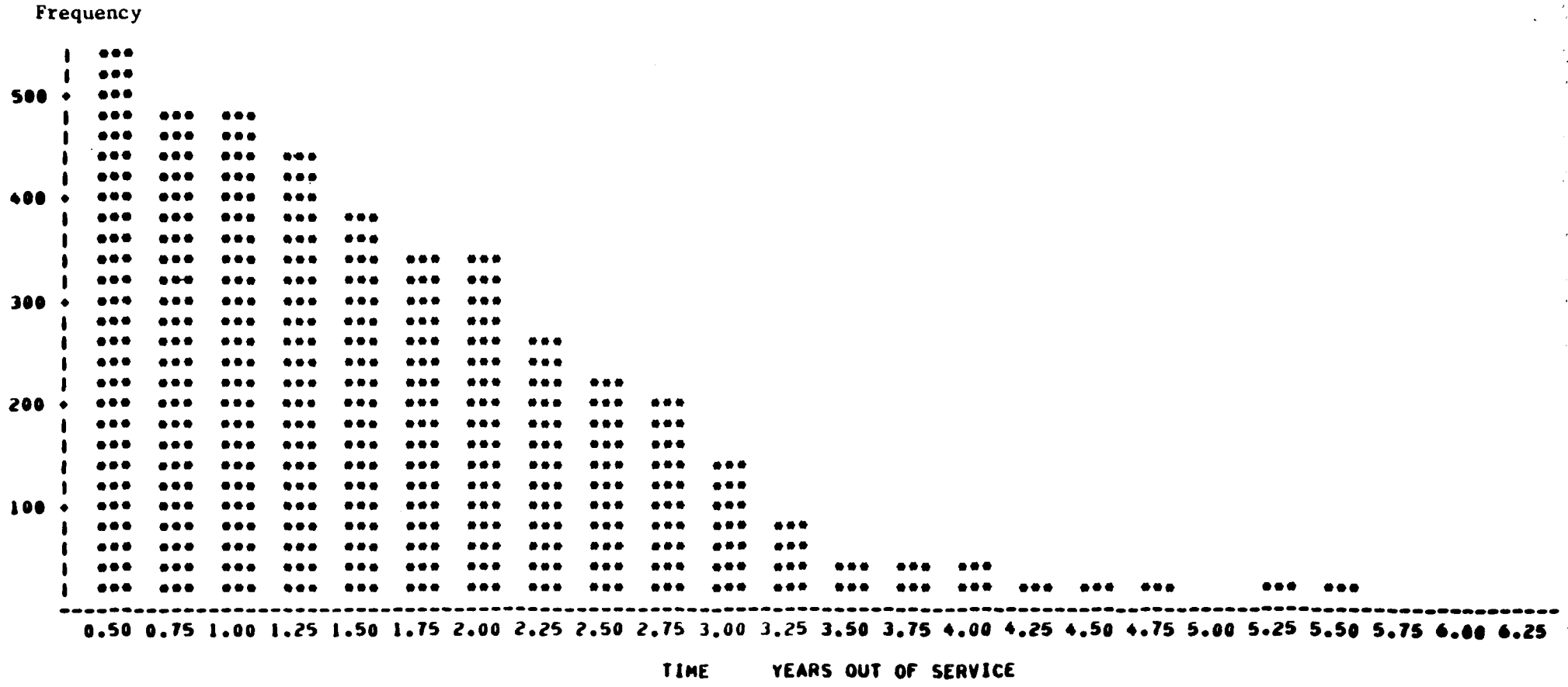

Figure 5.4 Years Out of Service (1977 Cohort)

Frequency Bar Chart

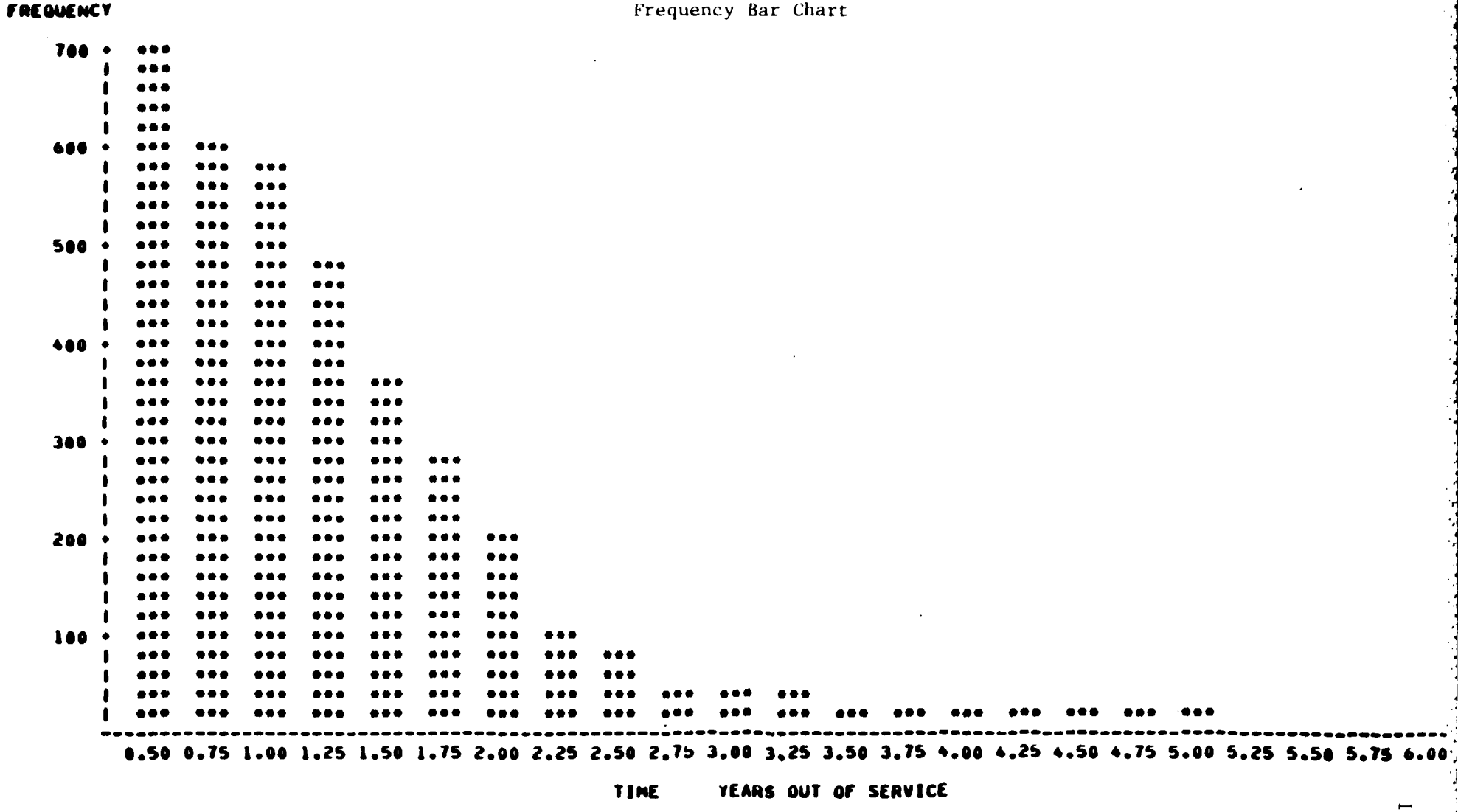

TABLE 5.4

Years Out of Service (1974) Cohort

Time	Years Out of Service			
	Frequency	Cum. Freq.	Percent	Cum. Percent
0.50	387	387	9.783	9.783
0.75	326	713	8.241	18.023
1	342	1055	8.645	26.668
1.25	286	1341	7.230	33.898
1.50	282	1623	7.128	41.026
1.75	205	1828	5.182	46.208
2	237	2065	5.991	52.199
2.25	203	2268	5.131	57.331
2.50	198	2466	5.005	62.336
2.75	193	2659	4.879	67.214
3	186	2845	4.702	71.916
3.25	175	3020	4.424	76.340
3.50	196	3216	4.954	81.294
3.75	148	3364	3.741	85.035
4	175	3539	4.424	89.459
4.25	61	3600	1.542	91.001
4.50	67	3667	1.694	92.695
4.75	56	3723	1.416	94.110
5	45	3768	1.138	95.248
5.25	29	3797	0.733	95.981
5.50	30	3827	0.758	96.739
5.75	18	3845	0.455	97.194
6	28	3873	0.708	97.902
6.25	15	3888	0.379	98.281
6.50	16	3904	0.404	98.686
6.75	13	3917	0.329	99.014
7	10	3927	0.253	99.267
7.25	5	3932	0.126	99.393
7.50	5	3937	0.126	99.520
7.75	7	3944	0.177	99.697
8	6	3950	0.152	99.848
Over 8.00	6	3956	0.152	100.000

Independent Variables	Value	Professional Performance	Military Behavior	Leadership	Military Appearance	Adaptability
Entry Age	18	3.52	3.49	3.48	3.49	3.58
	19-20	3.55	3.50	3.48	3.49	3.57
	21-25	3.56	3.51	3.50	3.52	3.58
	Over 25	3.40	3.56	3.33	3.59	3.61
Race	White	3.54	3.50	3.49	3.49	3.57
	Black	3.39	3.41	3.35	3.48	3.49
	Other	3.57	3.52	3.51	3.54	3.60
Education	Less than high school	3.46	3.41	3.52	3.44	3.51
	High school	3.53	3.50	3.48	3.49	3.57
	Greater than high school	3.57	3.53	3.51	3.53	3.59
Job Classification	Military	3.50	3.50	3.51	3.47	3.54
	Electronic	3.59	3.51	3.50	3.52	3.57
	Technical	3.52	3.49	3.47	3.48	3.57
	Support	3.56	3.60	3.53	3.56	3.61
	Crafts	3.52	3.48	3.44	3.47	3.59
	Non-Occupational	3.50	3.47	3.59	3.47	3.53
Entry Pay	1	3.57	3.47	3.46	3.47	3.56
	2	3.62	3.60	3.56	3.52	3.63
	3	3.56	3.51	3.49	3.52	3.57
Career Status	Stayer	3.53	3.50	3.51	3.50	3.56
	Leaver	3.54	3.49	3.45	3.49	3.58
	Reentrant	3.51	3.48	3.49	3.48	3.55
TOTAL		3.53	3.49	3.48	3.49	3.56

obtained from the National Military Personnel Records Center in St. Louis, Missouri and the Navy Recruiting Command in Arlington, Virginia.

Description of Variables

Four types of variables were used: sociodemographic, military career, job description, and job performance. The sociodemographic variables were age, race, and education. The military career variables included a measure of the time spent in the Navy; entry paygrade; and a classification of military career status as stayer, leaver, or reentrant. The job description data were used to classify an individual's job into one of the following six categories: general military, electronic, support, technical, crafts, or non-occupational. The job performance data included measures identified as professional performance, military behavior, leadership and supervisory ability, military appearance, and adaptability. These ratings were recorded as two-digit numerical ratings which ranged from 1.0 to 4.0. The higher the rating, the better the performance rating.

Statistical Analysis

Descriptive analysis. A descriptive analysis was completed for each variable. This analysis included means for each peformance measure. These means were computed for the whole sample and for selected subcategories of the sample. Table 6.1 summarizes these means for all observations. The reported values include multiple observations for the 401 individuals in the sample. The total number of observations (n = 2,550) represents approximately 6.4 observations for each person.

Method

Description of the Population

The population included all enlisted men who entered the Navy for the first time during FY74 to FY76 (that is July 1, 1973 to June 30, 1976). The population excluded officers, women, and those who were in the Navy for less than three months.

Description of the Sample

A sample of 1,129 people was drawn. The sample was drawn by first classifying all members of the population into one and only one of the following career classifications: stayers, leavers, and reentrants. Stayers had more than 72 months of continuous[a] service in the military. Leavers had less than 72 months of continuous[a] service in the military. Reentrants had a break of three or more months in military service. A random sample was attempted within each of these three classifications so that the number of people within each classification was approximately equal. Since performance records could not be located for 728 individuals in the original sample, these 728 people were excluded from the final sample. The remaining 401 people included 108 stayers, 212 leavers, and 81 reentrants.

Procedure

The base population data were obtained from the Defense Manpower Data Center (DMDC) in Monterey, California. Performance records were

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[a]Service was classified as continuous if there was no break in service or all breaks in service were less than three months.

A second policy implication concerns the statistically significant association found between job performance ratings when first entering the military and later performance ratings. Apparently, first impressions are valid predictors of later performance. This result, if combined with the scoring scheme suggested in Chapter 2, could yield a powerful tool for military manning experts to use to increase their effectiveness in the early location of high potential career personnel.

A third policy implication concerns the poor military archive data quality. No data base-dependent scheme can work if analysts cannot locate personnel records. Complete performance records could not be found for 728 of 1,129 people. This inability is not only incredible, but it also leads us to question the value of continuing a system of detailed performance appraisals. The value of such a system is realized only if the performance records are accessible.

Background

Performance in organizational settings is believed to be affected by three major classes of variables: motivation, abilities and traits, and role perceptions (Cummings and Schwab, 1973; Porter and Lawler, 1968; Vroom, 1960). The importance of abilities and traits in affecting good performance is clear, although the relationship between motivation and performance is less obvious. It is generally assumed that Navy enlisted personnel are motivated by at least three factors: obtaining training, being paid, and receiving promotions. However, this motivation and the possible effect on job performance are topics which merit further empirical investigation.

men who enlisted between FY74 to FY77. Performance ratings on various dimensions ranged between 1.0 and 4.0.

Results of this study indicated that some significant relationships exist between performance ratings and other variables. Higher performance ratings were associated with the following:

- being in one of the occupational categories that required training
- having been in the Navy longer,
- having had a higher initial performance rating, and
- being white. Blacks were rated significantly lower than non-blacks for all performance measures except military appearance. However, the sizes of these differences were small.

No statistical differences between reentrants and other recruits were found even though such persons had lower than average performance ratings on each criterion.

A Summary of Policy Implications

It would be inappropriate to derive extensive policy implications from an exploratory study such as this one. Further analysis is suggested, however, especially dealing with the racial results. As compared to whites, black enlisted men have lower performance ratings and lower rates of pay increase (Chapter 4). These results are particularly striking because the race difference appears even when other variables (education, job, age, etc.) are accounted for. Why do these results appear? Who are the supervisors? Are the military performances or the biases of the supervisor being recorded? While beyond the scope of this overall study, such issues warrant further analysis.

CHAPTER 6

JOB PERFORMANCE RATINGS OF NAVY PERSONNEL

Margaret E. Mitchell and Stanley P. Stephenson, Jr.

In this study the authors consider various factors related to the job performance ratings of Navy enlisted men in the post-draft era. Analyzed factors included sociodemographic characteristics, job data, career characteristics, and specific performance ratings. The determinants of performance ratings supervisors were considered, as well as the relationship between performance ratings made at different times. The study was a pilot or preliminary study using a small sample (401 individuals).

This study sought to determine the relationship between performance ratings and factors measuring training, ability, and pay by addressing the following questions:

- How do characteristics of the individual, his training, and military experience affect job performance?
- How well do early performance ratings predict later performance ratings?
- Does the level of entry pay affect the level of performance?

The Chapter in Brief

In an effort to evaluate the relative quality of the prior-service recruit, researchers obtained and processed supervisory performance ratings for a sample of enlisted Navy men from military archives and matched these data to samples from DMDC records for all enlisted Navy

REFERENCES

Becker, Gary. Human Capital, 2nd Ed. New York: Columbia University Press, 1978.

specific human capital theory. The greatest anomoly, however, is for FY74, FY75, and FY76 military job recipients. Just why they should have stayed out longer is not immediately clear and warrants further research.

A final comment concerns the possible changing effects or "trend" which we discussed previously. After controlling for personal and military history factors, we find significant and increasingly shorter out of military time periods for persons who entered in FY74 relative to those who entered later. Part of this difference may have been due to measurement artifacts and yet graphical and tabular results presented earlier imply a behavioral shift as well. This latter effect may have been due to the increased effort by the U.S. Navy recruiters after 1978 to actively recruit from the prior-service community.

Table 5.8

Summary[a] of Regression Analyses for Time Out of Service

Independent Variables	FY74	FY75	FY76	FY77	FY74-77[b]
Intercept	1437.903 (17.44)***	1100.09 (8.94)***	684.665 (12.68)***	807.892 (19.29)***	1193.157 (37.37)***
Education - Greater than High School	113.885 (3.11)**	36.589 (1.17)	57.717 (1.14)	81.416 (2.01)*	59.479 (3.23)*
Education - Less than High School	-72.389 (-3.96)***	-17.090 (-1.11)	-35.034 (-2.52)*	-25.889 (-2.35)*	-37.289 (-4.87)***
Race - Other	.290 (.00)	-32.883 (-0.56)	-140.278 (-2.86)**	-82.228 (-3.29)***	-76.639 (-3.00)**
Race - Black	-148.956 (-6.40)***	-51.501 (-2.70)*	-59.876 (-3.69)***	-66.757 (-5.59)***	-79.004 (-8.64)***
Entry Age	-3.153 (-0.78)	-1.387 (-0.42)	7.767 (2.85)**	7.727 (3.69)***	3.157 (2.91)*
Pay at Exit	-164.927 (-19.33)***	-108.017 (-15.31)***	-68.835 (-12.05)***	-119.761 (-19.98)***	-118.144 (-34.96)***
Support Job	37.491 (1.02)	18.600 (.68)	-52.823 (-2.20)*	-90.514 (-4.56)***	-26.736 (-1.97)*
Mechanical Job	50.256 (1.48)	23.133 (.95)	-11.722 (-.54)	-82.504 (-4.60)***	-7.600 (-.62)
Military Job	150.460 (4.49)***	75.792 (3.16)***	63.603 (3.12)**	-65.388 (-2.99)**	58.105 (4.95)***
Technical Job	33.087 (.95)	13.291 (.52)	-35.692 (-1.60)	-87.527 (-4.69)***	-19.931 (-1.57)
Crafts Job	89.907 (2.03)*	31.143 (.90)	9.540 (.32)	-89.823 (-3.76)***	7.271 (.43)
Year 1975	--[c]	--[c]	--[c]	--[c]	-106.310 (-11.96)***
Year 1976	--[c]	--[c]	--[c]	--[c]	-249.788 (-27.52)***
Year 1977	--[c]	--[c]	--[c]	--[c]	-362.075 (-38.12)***
F Ratio	66.85	43.47	34.18	128.55	299.51
r^2	.157	.100	.084	.281	.208
Sample Size	3956	4300	4103	3634	15993
Mean of Dependent Variable	800.135	703.740	562.245	429.628	628.998

[a]Value in parentheses indicates T value.

[b]Dependent variable is the number of days between leaving the Navy and reentering.

[c]Not included in this model.

*$.01 \leq p < .05$

**$.001 \leq p < .01$

***$p < .001$

Four separate regression analyses were completed for the data--for fiscal years 1974, 1975, 1976, and 1977, which is a conservative approach to allow for between year changes in regression coefficients. A separate regression analysis was also completed for the combined data for FY74 through FY77. In all regression analyses the individual was the unit of analysis.

Results

Regression Analysis. The main regression results are shown in Table 5.8. Four empirical results are especially important. First, the regression models are each highly significant at conventional levels of statistical significance. This implies a considerable gain over the use of the regression model versus the unadjusted mean time out in making predictive statements. Secondly, several results are both highly significant and consistent with the hypotheses derived earlier. Confining our remarks to the pooled year, FY74-77, we find that:

- black or Hispanic men averaged 79 days (or 76) fewer days out of the military than white men;
- persons with less than a high-school education averaged 38 fewer days out;
- those with a greater exit pay had less days out (118 fewer days) per added paygrade.

Third, as per occupational training effects, results were mixed. For the FY77 cohort, having received a job classification was associated with a 20 percent shorter length of time out than for persons without a job classification. To the extent that each such job contains specific (vs. general) training, such a result is consistent with Becker's

may have been simply due to the fact that persons entering in 1974 had more potential civilian time than persons entering in 1977 since May 1983 was a common data cut-off point for both groups. Yet this does not appear to have been the only explanation: in Tables 5.4 to 5.7 one may observe a rising proportion or absolute number of reentrants returning within one year.

Statistical Analysis

Descriptive Analysis. T.. -riptive analysis included frequencies and percentages for each of the independent variables which were included in the regression analyses. Data were summarized for each of the fiscal years 1974, 1975, 1976, and 1977 as well as for the total of these four years. This analysis is presented in Tables 5.2 and 5.3.[a] The overall population proportions are quite similar to those for reentrants which implies that sample selection bias may not be a problem.

Regression Analysis

Ordinary least squares (OLS) regression analysis was used to analyze the data. The basic model was $Y = F(X_1, \ldots X_5, P, Z_1, \ldots Z_5)$. Y was defined as time out of the Navy. $X_1, \ldots X_7$ refer to age, race, and formal education measures. P is the person's paygrade when he left the Navy. $Z_1, \ldots Z_5$ described the person's job while in the Navy.

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[a] Table 2 entries may be compared with similar tables for all enlistees in prior chapters so as to judge the extent of potential selection bias.

TABLE 5.7
Years Out of Service (1977) Cohort

	Years Out of Service			
Time	Frequency	Cum. Freq.	Percent	Cum. Percent
0.50	696	696	19.152	19.152
0.75	605	1301	16.648	35.801
1	578	1879	15.905	51.706
1.25	483	2362	13.291	64.997
1.50	361	2723	9.934	74.931
1.75	286	3009	7.870	82.801
2	197	3206	5.421	88.222
2.25	97	3303	2.669	90.892
2.50	73	3376	2.009	92.900
2.75	46	3422	1.266	94.166
3	47	3469	1.293	95.460
3.25	38	3507	1.046	96.505
3.50	27	3534	0.743	97.248
3.75	18	3552	0.495	97.744
4	5	3567	0.413	98.156
4.25	8	3585	0.495	98.652
4.50	11	3596	0.303	98.954
4.75	14	3610	0.385	99.340
5	10	3620	0.275	99.615
5.25	7	3627	0.193	99.807
5.50	3	3630	0.083	99.890
5.75	1	3631	0.028	99.917
6	3	3634	0.083	100.000

TABLE 5.6

Years Out of Service (1976) Cohort

Class	Years Out of Service			
	Frequency	Cum. Freq.	Percent	Cum. Percent
[illegible]	[illegible]	530	12.917	12.917
[illegible]	[illegible]	1001	11.479	24.397
[illegible]	481	1482	11.723	36.120
1.25	433	1915	10.553	46.673
1.50	382	2297	9.310	55.983
1.75	342	2639	8.335	64.319
2	344	2983	8.384	72.703
2.25	258	3241	6.288	78.991
2.50	215	3456	5.240	84.231
2.75	200	3656	4.874	89.106
3	138	3794	3.363	92.469
3.25	75	3869	1.828	94.297
3.50	43	3912	1.048	95.345
3.75	37	3949	0.902	96.247
4	37	3986	0.902	97.148
4.25	23	4009	0.561	97.709
4.50	14	4023	0.341	98.050
4.75	25	4048	0.609	98.660
5	9	4057	0.219	98.879
5.25	14	4071	0.341	99.220
5.50	14	4085	0.341	99.561
5.75	8	4093	0.195	99.756
6	5	4098	0.122	99.878
6.25	4	4102	0.097	99.976
6.50	1	4103	0.024	100.000

TABLE [illegible]

Years Out of Service ([illegible]) Cohort

	Years Out of Service			
Time	Frequency	Cum. Freq.	Percent	Cum. Percent
0.50	[illegible]	[illegible]	[illegible]	[illegible]
0.75	[illegible]	[illegible]	[illegible]	[illegible]
1	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]5.698
[illegible]	[illegible]	[illegible]	[illegible].256	80.953
[illegible]	[illegible]	3668	4.349	85.302
[illegible]	[illegible]	3823	3.605	88.907
[illegible]	[illegible]	3952	3.000	91.907
4	[illegible]	4056	2.419	94.326
4.25	51	4107	1.186	95.512
4.50	34	4141	0.791	96.302
4.75	38	4179	0.884	97.186
5	33	4212	0.767	97.953
5.25	19	4231	0.442	98.395
5.50	16	4247	0.372	98.767
5.75	15	4262	0.349	99.116
6	13	4275	0.302	99.419
6.25	9	4284	0.209	99.628
6.50	2	4286	0.047	99.674
6.75	4	4290	0.093	99.767
7	6	4296	0.140	99.907
7.25	4	4300	0.093	100.000

Regression analysis. The data were analyzed through ordinary least squares regression analysis. Two models were used: Model I was defined as

$P_i = f\ (X_1, \ldots X_5, T_i, G, W_1, W_2, Z_1, \ldots Z_5)$.

P_i = the performance measure.

$X_1, \ldots X_5$ = the sociodemographic variables (age, race - black, race - other, education - less than high school, and education - greater than high school).

T_i = the length of time in the Navy when the performance variable P_i was measured.

G = the entry pay grade.

W_1 and W_2 = dichotomous variables which referred to the three military career classifications (stayer, leaver, or reentrant).

$Z_1, \ldots Z_5$ = dichotomous variables which referred to the six job classifications (military, electronic, support, technical, crafts, or non-occupational).

Model II was defined as

$P_i = f\ (X_1, \ldots X_5, \Delta T_1^i, G, W_1, W_2, Z_1, \ldots Z_5, P_1)$.

These variables were similar to those used in Model I. There were two exceptions to this similarity. First, two measures of performance were used: P_1 (the first performance measure) and P_i (later performance rating, $i>1$). These measures of performance were made at two different points in times (T_1, T_i). Second, the ΔT_1^i variable was used. This variable was defined at T_i minus T_1.

Results

Descriptive Analysis

Means were computed for each of the five performance ratings. The mean values, which are presented in Table 6.1, were 3.53 for professional performance, 3.49 for military behavior, 3.48 for leadership, 3.49 for military appearance, and 3.56 for adaptability.

Regression Analysis

Model I. The regression analysis for Model I is presented in Table 6.2. The job classification variables were associated with statistically significant relationships more frequently than any other independent variables. For all dependent variables except leadership, statistically significant effects were found for all five independent variables which referred to job classifications. Individuals in all the occupational classifications (that is, general military, electronic, technical, support, or crafts) were rated higher than those in the nonoccupational category. Significant differences were also found for one of the independent variables referring to race. For all performance measures except military appearance, blacks were rated significantly lower than non-blacks. For two dependent variables (professional performance and adaptability) the performance rating was significantly related to the time at which the rating was made. The longer the person had been in the Navy, the higher was the rating of professional performance and adaptability. (This may, of course, have simply been due to the early attrition of poor performers--see Chapter 7 for related results.)

Table 6.2

Summary of Regression Analysis[a]: Model I

Independent Variable \ Dependent Variable	Professional Performance	Military Behavior	Leadership	Military Appearance	Adaptability
Intercept	3.358 (34.14)***	3.232 (34.84)***	3.654 (20.25)***	3.211 (37.44)***	3.395 (41.67)***
Age	-.001 (-0.26)	3.691[c] (0.01)	-.006 (-0.94)	.003 (0.65)	.002 (0.48)
Race - Black	-.125 (-5.17)***	-.048 (-2.09)*	-.141 (-3.58)***	.026 (1.23)	-.066 (-3.26)**
Race - Other	.020 (0.53)	-.003 (-0.09)	.016 (0.33)	.040 (1.28)	.015 (0.51)
Education- Greater than High School	.047 (1.75)	.038 (1.55)	.036 (0.93)	.024 (1.08)	.035 (1.65)
Education - Less than High School	-.020 (-0.85)	-.040 (-1.74)	-.051 (-1.46)	-.016 (-0.77)	-0.031 (-1.53)
Job - General Military	.131 (2.53)*	.239 (4.78)***	.023 (0.17)	.160 (3.47)***	.088 (2.01)*
Job - Electronic	.190 (3.86)***	.219 (4.64)***	-.030 (-0.23)	.196 (4.50)***	.096 (2.32)*
Job - Technical	.137 (2.97)**	.219 (4.90)***	-.035 (-.028)	.169 (4.10)***	.102 (2.62)**
Job - Support	.188 (2.97)**	.347 (5.20)***	.017 (0.11)	.240 (3.88)	.160 (2.73)**
Job - Crafts	.150 (3.01)**	.218 (4.56)	-.067 (-0.52)	.160 (3.60)***	.124 (2.93)**
Entry Pay	.004 (0.50)	.014 (1.83)	.001 (0.05)	.018 (2.51)*	.000 (-0.03)
Stayer	(-.016)	(0.08)	(2.68)**	(0.55)	(-1.22)
Reentrant	-.002 (-0.10)	.005 (0.28)	.039 (1.60)	.011 (0.75)	-.023 (-1.62)
Time[b]	5.687 (3.73)***	2.222 (1.63)	-3.417 (-1.53)	1.679 (1.34)	5.855 (4.90)***
F_2 ratio	6.79	5.06	2.36	4.10	4.49
r^2	.043	.029	.037	.024	.026
Sample Size	2,120	2,381	883	2,383	2,376
Mean of dependent variable	3.53	3.49	3.48	3.49	3.56

[a] Value in parentheses indicates T statistic.

[b] Measured as .00001 days.

[c] Measured as .00001 years.

* $.01 \leq p < .05$.

** $.001 \leq p < .01$.

*** $p < .001$.

Model II. The regression analysis for Model II, which is summarized in Table 6.3, indicated significant effects for the job classification variables; first performance rating; change in time; and the dichotomous variables identified as race - black, stayer, and reentrant.

The largest effects were generally associated with the first performance rating. The higher the initial performance rating, the higher were the later performance ratings. This was true for all four performance measures. Classification in one of the occupational job categories (general military, electronic, technical, support, or crafts) was also related to a higher performance rating for all four performance measures. The greater the difference in time between the specific performance rating and the first performance rating, the higher was the rating of professional performance and adaptability. Compared with non-blacks, blacks received lower ratings in professional performance, military behavior, and adaptability.

Leavers received the lowest ratings in military appearance. Stayers and reentrants received higher ratings in military appearance.

Discussion

This study, which was only a pilot study of performance ratings, indicated that some significant relationships exist between performance ratings and other variables. Most of the findings were in the expected direction. Higher performance ratings were associated with being in one of the occupational categories which required training, having been in the Navy longer, and having had a higher initial performance rating.

Table 6.3

Summary of Regression Analysis[a]: Model II

Independent Variable \ Dependent Variable[b]	Professional Performance	Military Behavior	Military Appearance	Adaptability
Intercept	2.39 (15.04)***	2.49 (18.49)***	1.779 (13.59)***	2.618 (20.91)***
Age	.003 (0.44)	-.001 (-0.11)	.006 (1.37)	.007 (1.67)
Race - Black	-.088 (-3.10)**	-.064 (-2.57)**	.036 (1.60)	-.057 (-2.71)**
Race - Other	-.012 (-0.23)	.003 (0.07)	.028 (0.86)	-.010 (-0.31)
Education - Greater than High School	-.065 (-1.67)	.033 (1.22)	.025 (1.05)	.027 (1.17)
Education - Less than High School	-.016 (-0.61)	-.126 (-1.07)	.032 (1.46)	-.017 (-0.83)
Job - General Military	.204 (3.61)***	.274 (5.04)***	.227 (4.67)***	.094 (2.03)*
Job - Electronic	.205 (3.24)***	.298 (5.74)***	.321 (6.88)***	.117 (2.67)**
Job - Technical	.150 (2.98)**	.242 (4.94)***	.236 (5.39)***	.085 (2.04)*
Job - Support	.216 (2.68)**	.404 (5.61)***	.356 (5.50)***	.173 (2.84)**
Job - Crafts	.185 (3.41)***	.252 (4.77)***	.232 (4.92)***	.100 (2.25)*
Entry Pay	-.005 (-0.34)	.009 (1.10)	.013 (1.74)	-.002 (-0.34)
Stayer	-.029 (-1.24)	.008 (0.51)	.031 (2.09)*	-.012 (-0.85)
Reentrant	.021 (0.90)	.009 (0.50)	.035 (2.19)*	-.014 (-0.96)
Change in Time[c]	6.950 (2.98)**	2.398 (1.43)	1.582 (1.05)	5.118 (3.59)***
First Performance Rating	.265 (8.78)***	.218 (8.01)***	.378 (14.03)***	.211 (8.27)***
F_2 ratio	9.33	9.37	18.25	7.46
r^2	.125	.068	.125	.055
Sample Size	993	1,933	1,932	1,921
Mean of dependent variable	3.52	3.51	3.50	3.59

[a] Value in parentheses indicates T statistic.

[b] Leadership variable excluded because of small sample size (r=69).

[c] Measured as .00001 days.

* $.01 \leq p < .05$.

** $.001 \leq p < .01$.

*** $p < .001$.

The significant difference for the race variable was unexpected. Blacks were rated significantly lower than non-blacks for all performance measures except military appearance. However, the sizes of these differences were small. The amount of difference associated with the race - black variable ranged from .05 to .13. Since the scale for the dependent measures ranged from 1.0 to 4.0, this difference is small. It is also much smaller than the differences associated with other independent variables such as job classification and initial performance rating. The differences associated with the job classification variables ranged from .09 to .36. Differences associated with the initial performance rating ranged from .21 to .38.

For two variables (entry pay and time in the Navy) the failure to find a statistically significant relationship was unexpected. Specifically, the entry paygrade, which is assumed to indicate an individual's value to the Navy, was significantly related to only one performance measure in only one model. Also, the greater amount of time in the Navy was associated with higher performance ratings for professional performance and adaptability, but no significant relationships were found for the measures of military behavior, leadership, or military appearance.

The results of this study suggest that further investigation of performance ratings is justified. The possibility of expanding this pilot study to a larger scale is also being considered.

REFERENCES

Cummings, L. L., Dunnette, M. D., Lawler, E. E., III, and Weick, K. E. Managerial behavior, performance, and effectiveness. New York: McGraw-Hill, 1970.

Porter, L. W., and Lawler, E. E., III. Managerial attitudes and performance. Homewood, Illinois: Irwin, 1968.

Vroom, V. H. Work and motivation. New York: Wiley, 1964.

CHAPTER 7

VOLUNTARY AND INVOLUNTARY TURNOVER OF NAVY ENLISTED PERSONNEL

David R. Ellison,* John M. Stevens, and Stanley P. Stephenson, Jr.

The Chapter in Brief

Though turnover is one of the most examined topics in the organizational behavior and management literature, the results of recent research have suggested that a further refinement of the dependent variable as well as longitudinal research designs are needed to further develop turnover theory and improve research. This study examines the involuntary and voluntary turnover of 79,652 organizational entrants and 6,383 organizational reentrants using survival analysis techniques. Non-parametric statistical analyses as well as discriminant analysis were used to answer the research questions and test related propositions. Some of the results demonstrated dramatic differences between the involuntary and voluntary turnover curves for entrants and reentrants, and others highlighted the commonalities and differences between predictors of turnover in the leaving categories. Prior-work related factors improved prediction of reentrant involuntary, but not voluntary, turnover. The implications of the findings for turnover theory and practice are presented.

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*David Ellison, LCD, USN, was a co-investigator on the overall project while completing his Ph.D. in Business Administration at The Pennsylvania State University between September 1981 and December 1983. Professor John Stevens, Department of Public Administration, served on Ellison's dissertation committee. Dr. Ellison's study (1984) is the main source of the research reported here.

Summary of Policy Implications

Four policy implications emerge from this study based on the behavior of all 1978 Navy enlistments.

- Involuntary turnover is somewhat less for reentrants than for entrants: 22.2 vs. 28.8%.
- There are substantial losses of reentrants after only two years. (See Figure 3.) From the plot about 17% is the two-year loss. Is recruiting prior-service personnel worth it for only two years?
- The above two items seem to favor the four-year survival of reentrants. However, the proportion of reentrants in 1978 was only 6,383/86,035 = 7.4%. Research from previous chapters, the comparative quality apparent in the discriminant analyses (Tables 4-6), and the interpretations suggest many of the same reservations for recruiting reentrants as appeared in the analyses of previous chapters.
- For screening reentrants, "previous work-related factors could be used to avoid involuntary turnover of reentrants, but would not help for voluntary turnover." (See Tables 5 and 6.)

In addition, interested readers may also wish to note the concluding section on managerial implications.

Background and Purpose

Personnel turnover appears to be one of the most studied and reported phenomenon in the organization and management literature. Bluedorn (1982) estimated that over 1500 turnover studies had been reported in this century and Muchinsky and Morrow (1980) estimated 1500 to 2000 over a period of 65 years. The recent management literature

also reinforces this historical trend. In spite of this intensive past and ongoing focus on turnover, researchers such as Wagner, Pfeffer, and O'Reilly (1984); Abelson and Baysinger (1984); Mowday, Koberg, and McArthur (1984); Sheridan and Abelson (1983); Mobley (1982); Dreher (1982); Dalton, Todor, and Krackhardg (1982); Stumpf and Dawley (1981); Price and Mueller (1981); Mobley, Griffeth, Hand, and Meglino (1979); Martin (1979); and Muchinsky (1978) have identified serious issues or problems that consistently recur or are newly identified in published research.

For instance, in a recent study, Wagner, et al. (1984) found a two-stage turnover process: first, turnover is related to the demographic structure of the group; second, top managers are most likely to leave when their goals, beliefs, and values differ from the group and result in conflict. Also, individual level distinctions such as age were found to determine who left the organization once conflict was experienced. The authors concluded that research focusing upon individual attributes and correlations in isolation has neglected other important variables such as relationship or demographic structures. This line of reasoning is somewhat similar to Mobley (1982) who questioned whether turnover research adequately addresses the process, consequences, performance, and conceptual-empirical relationships related to turnover and "withdrawal" behavior.

Mobley (1982) also documented the long-standing nature of many turnover research problems and the important need for longitudinal research that goes far beyond static correlations in order to deal with the post-baby boom market, laws on extension of mandatory retirement, age, longer life expectancies and promotion-career opportunities in the

aging baby boom cohort. In addressing certain methodology issues in turnover research, Mowday, et al., (1984) noted the need to move beyond job attitude-turnover relationships and limited measurement techniques. Further, after extensive cross validation analysis, Mowday, et al. (1984) questioned the generalizability of certain turnover models used to guide previous investigations because their within and between cross validation tests did validate their model across samples.

In addition to these conceptual and methodological issues, other significant and long-standing problems associated with turnover research have been identified in other recent reviews and research. For example, Sheridan and Abelson (1983) presented what they believed to be three major limitations found in job termination decisions. They were cross-sectional survey designs, varying time intervals between surveys and termination, and the assumptions that turnover is a continuous linear process. Using a cusp catastrophe model, their study results indicated that withdrawal to the point of voluntary termination is not a continuous linear function, but rather a discontinuous phenomenon. Though their findings on the voluntary turnover of nurses were considered tentative, they recommended longitudinal research designs to study the transition from retention to termination. Also, Mobley (1979), had earlier questioned whether turnover was a continuous linear process. Other measurement approaches were proposed by Stumpf and Dawley (1981), who defined the need to include valid dependent variables in turnover research, especially in terms of the voluntary-involuntary distinction. They concluded that relationships among multiple variables over time have to be understood using additional resources such as archival personnel data.

Price and Mueller (1981) identified certain existing, explanatory models of turnover that lacked inclusiveness and tested a causal model of voluntary turnover (Price, 1977). Their empirical tests of the Price (1977) model with a sample of nurses found that commitment (intent to stay) is the most important, and opportunity the second most important, predictor of turnover. Other variables such as training and job satisfaction also had meaningful effects. Price and Mueller (1981) concluded with eight recommendations concerning variables to be included in future research (loyalty versus commitment, organizational size, opportunity, sex, occupations), data collection periods, measurement, causal ordering and longitudinal designs so that the low levels of explanatory power of existing turnover models would be improved.

In addition to these periodic calls for longitudinal designs, Dreher (1982) emphasized that the performance level of the individual requires more conceptual and empirical treatment in the turnover research process because current theory is contradictory. In an extensive review of employee turnover, Mobley, et al. (1979) proposed a conceptual model for integrating diverse research findings. Their individual level model included individual, economic, organizational, job-related, labor market, satisfaction, work value, and expectation variables with independent and moderating relationships resulting in turnover behavior. Even with the evolution of more comprehensive models, current researchers are concluding that integrative, multivariate, longitudinal research designs are required to better understand turnover and address deficiencies in the development of turnover theory (in addition to the previously cited literature; see, for example, Muchinsky and Morrow, 1980; Wanous, Stumpf, and Bedrosian, 1979; Sands,

978; Muchinsky, 1978; and more recently, Dalton and Todo, 1982; Mowday, t al., 1984; Sheridan and Abelson, 1983; and Wagner, et al., 1984).

tudy Approach and Research Design

The questions associated with concepts such as "withdrawal beha- ior," turnover theory, measurement of turnover, research methods, and anagerial/organizational implications found in relevant literature ndicate that important issues have yet to be resolved. The purpose of his study is to extend previous research on turnover, and improve nderstanding by addressing some of the long-standing needs such as ongitudinal research, better operational definitions of turnover, and a ultivariate framework. This approach will attempt to refine past fforts by focusing upon predictors of both involuntary and voluntary urnover of approximately 86,000 people over a four-year period in a arge governmental organization, the United States Navy, in the U.S. epartment of Defense. A new dimension to current research is added by xamining the turnover of organizational reentrants. In this study, an rganizational entrant is one who enters the organization for the first ime and the organizational reentrant is one who returns to the same rganization in which he or she was previously employed. This study ocuses upon differences in the longitudinal turnover outcomes and ehavior of organizational entrants and reentrants in addition to the ifferences in the factors that best predict the involuntary and volun- ary turnover of each group of organizational members.

In attempting to provide a better understanding of the turnover ariable and to deal with the distinctions between involuntary and oluntary turnover behavior of organizational entrants and reentrants,

this study makes three comparisons and analyses. First, the turnover of organizational entrants and reentrants are compared in an effort to explore differences in the involuntary outcomes and voluntary turnover behavior of each group. Second, organizational entrants and reentrants are compared relative to a common set of turnover antecedents in order to explore differences between antecedents that predict the involuntary and voluntary turnover of each group. Also, the findings are compared to determine if prediction of organizational reentrant involuntary and voluntary turnover can be enhanced by utilization of information available from previous work-related experiences in the same organization. These three analyses attempt to confirm and refine predictors of involuntary and voluntary turnover, and explore the value of the organizational reentrant as an additional research focus to improve the development of turnover theory. The turnover model presented in Figure 1 is the research design being used to structure the research questions and the propositions that will be investigated.

Research Questions and Related Propositions

Research Question #1: Is turnover of organizational entrants the same as organizational reentrants?

Exploration of differences in the turnover of organizational entrants and reentrants requires that two comparisions be conducted. The involuntary component of turnover is investigated by determining the relationship between AB and CB as shown in Figure 7.1. The voluntary component of turnover is investigated by examining the relationship between AD and CD. In this cohort data, the nature of the military contract requires the conditional situation where an individual either

Table 7.3

Comparison To Investigate Differences
In Predictors of Organizational Entrant
and Reentrant Involuntary Turnover (Proposition III)

Organizational Entrant
Basic Involuntary Turnover Model

Groups[a]	Function
Survivor	-0.12
Involuntary Turnover	0.29
Variables[bc]	
Education	-0.80
TRM6YEAR	-0.75
Sex	0.67
Waiver Status	0.64
Rec Area 7	0.64
Rec Area 5	0.51
Rec Area 4	0.47
Race	-0.38
Age	0.06
Aptitude	-0.02
Canonical Correlation	0.18

Group	Percent Correct	Number of Cases Classified Into Each Group	
		Involuntary Turnover	Survivor
Involuntary Turnover	3.4	154	4,387
Survivor	98.8	137	11,100
Total	71.3	291	15,487

Organizational Reentrant
Basic Involuntary Turnover Model

Groups[a]	Function
Survivor	-0.13
Involuntary Turnover	0.45
Variables[bc]	
TRM5YEAR	-2.17
TRM3YEAR	-1.33
TRM2YEAR	-1.14
Marital Status	-0.80
Waiver Status	0.63
Education	-0.14
Age	-0.13
TRM6YEAR	-0.61
Aptitude	-0.01
Canonical Correlation	0.23

Group	Percent Correct	Number of Cases Classified Into Each Group	
		Involuntary Turnover	Survivor
Involuntary Turnover	1.2	17	1,344
Survivor	99.8	8	4,695
Total	77.7	25	6,039

[a] Canonical discriminant function evaluated at group means, i.e., function centroid.

[b] Standardized canonical discriminant function coefficients.

[c] $p \leq .01$

Table 7.2

Survival Tests of Distributional Differences Between Organizational Entrant and Reentrant Four-Year Voluntary Turnover Curves

GEHAN-WILCOXON TEST

ROUP	N	SUM OF SCORES
RANTS 1	5670	234117
RANTS 2	4957	-234117

X^2 = .74 1DF, P≤.39

LOGRANK TEST

GROUP	N	OBSERVED	EXPECTED	(O/E)**2/E
NTRANTS 1	5670	2275	2183.56	3.83
NTRANTS 2	4957	1610	1701.44	4.91

X^2 = 8.74 1 DF, $p \leq .003$

LIKELIHOOD RATIO TEST

GROUP	N	VOLUNTARY SEPARATIONS	LAMBDA
NTRANTS 1	5670	2275	0.000288
NTRANTS 2	4957	1610	0.000255

X^2 = 14.03 1 DF, $p \leq .0002$

Chi-Square Test of Aggregate Differences Between Organizational Entrant and Reentrant Voluntary Turnover

	Voluntary Turnover	Stayers	Total
nizational entrant	22,746	33,952	56,698
nizational reentrant	1,610	3,358	4,968
l	24,356	37,310	61,666

$\Sigma \left[\frac{(f_o - f_e)^2}{f_e} \right]$ f_o = obtained frequencies

f_e = expected frequencies

= 113.8 1 DF ; $p \leq .0001$

Table 7.1

7.1a Survival Tests of Distributional Differences Between Organizational Entrant and Reentrant Four-Year Involuntary Turnover Curves

GEHAN-WILCOXON TEST

GROUP	N	SUM OF SCORES
ENTRANTS 1	7964	-3404145
REENTRANTS 2	6372	3404145

X^2 = 80.61, 1 DF; $p \leq .0001$

LOGRANK TEST

GROUP	N	OBSERVED	EXPECTED	(O-E)**2/E
ENTRANTS 1	7964	2295	2023.09	36.55
REENTRANTS 2	6372	1415	1686.91	43.83

X^2 = 80.38, 1 DF; $p \leq .0001$

LIKELIHOOD RATIO TEST

GROUP	N	INVOLUNTARY SEPARATIONS	LAMBDA
ENTRANTS 1	7964	2295	0.000243
REENTRANTS 2	6372	1415	0.000178

X^2 = 86.16, 1 DF; $p \leq .0001$

7.1b Chi-Square Test of Aggregate Differences Between Organizational Entrant and Reentrant Involuntary Turnover

	Four-year Involuntary Turnover	Survivors	Total
Organizational entrant	22,954	56,698	79,652
Organizational reentrants	1,415	4,968	6,383
Total	24,369	61,666	86,035

$$\chi^2 = \Sigma \left[\frac{(f_o - f_e)^2}{f_e} \right]$$

f_o = obtained frequencies

f_e = expected frequencies

X^2 = 128.7, 1 DF ; $p \leq .0001$

7.3, and the statistical test results in Tables 7.1 and 7.2. Even though there appears to be a similar pattern of involuntary turnover for the entrants and reentrants as shown in Figure 7.2, the survival tests presented in Table 7.1a show that the statistical differences between the distributions of the entrant and reentrant curves are highly significant using all three tests ($P \leq .0001$). Results in Table 7.1b, which presents the test of aggregate differences between the turnover curves, are also highly significant. Reentrant involuntary turnover was less than entrant turnover so, Proposition I is supported.

The testing and results of Proposition II's distributional and aggregate components for voluntary turnover over the four-year period for the entrants and reentrants are presented in Figure 7.3 and Table 7.2. There are obvious visual differences in the turnover curves presented in Figure 7.3. Three statistical survival and Chi-Square tests in Table 7.2 support the distributional and aggregate differences, respectively, at a highly significant level. Therefore, in observing the results for voluntary entrant and reentrant turnover, Proposition II was supported with reentrant voluntary turnover being significantly less than entrant turnover.[a]

Research question two and the supporting propositions (III and IV) addressed commonalities and differences in predictors of entrant and reentrant turnover. The involuntary turnover results from the discriminant analyses are presented in Table 7.3. Age, which has been a significant negative influence on turnover in past studies, exhibits a mixed effect here with a negative influence on reentrant involuntary

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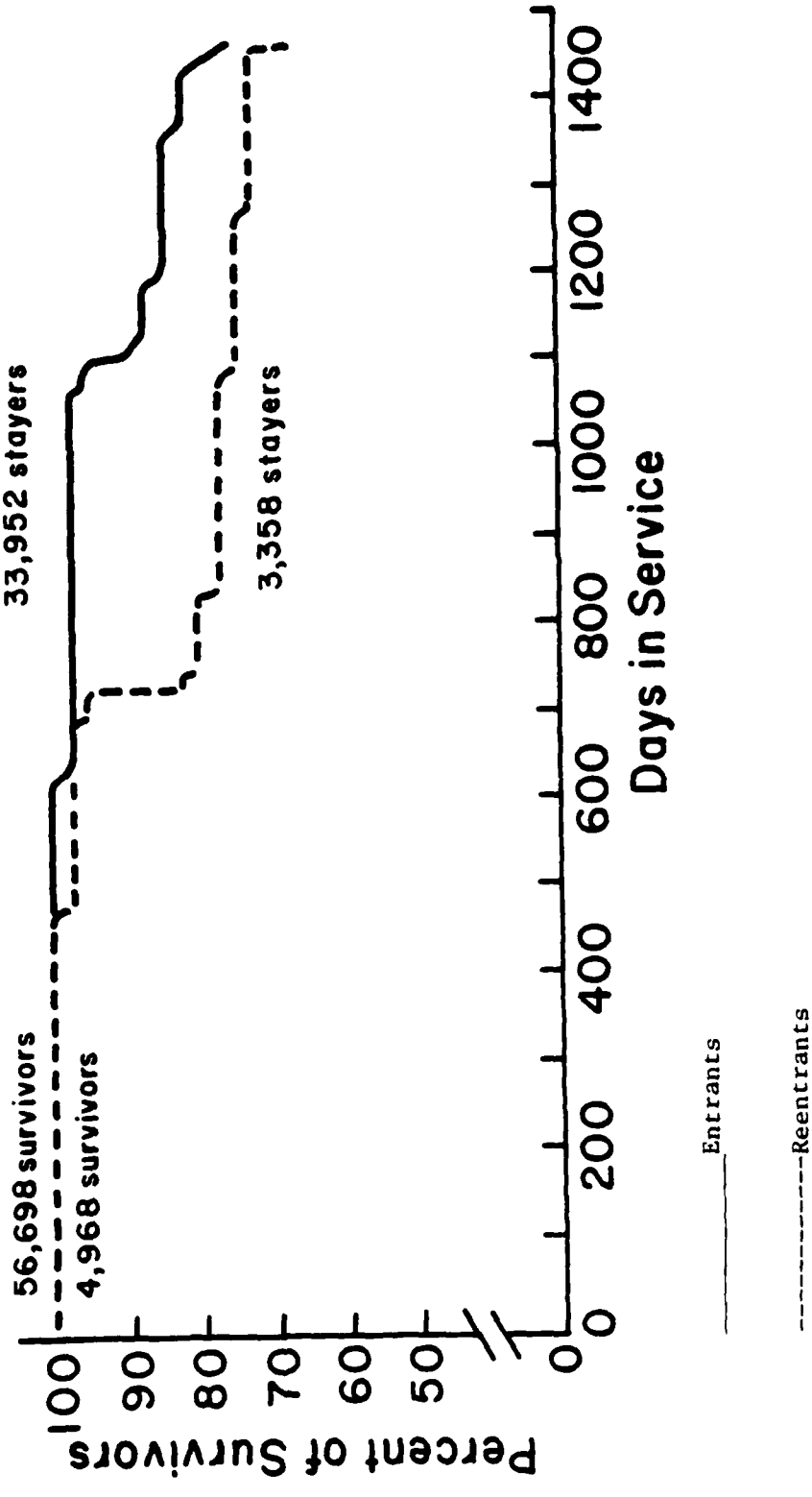
[a]Of course, reentrants can and did join for two- rather than four-year terms which entrants signed.

Figure 7.3

FOUR YEAR VOLUNTARY CURVES FOR ORGANIZATIONAL ENTRANTS AND REENTRANTS



Methodology

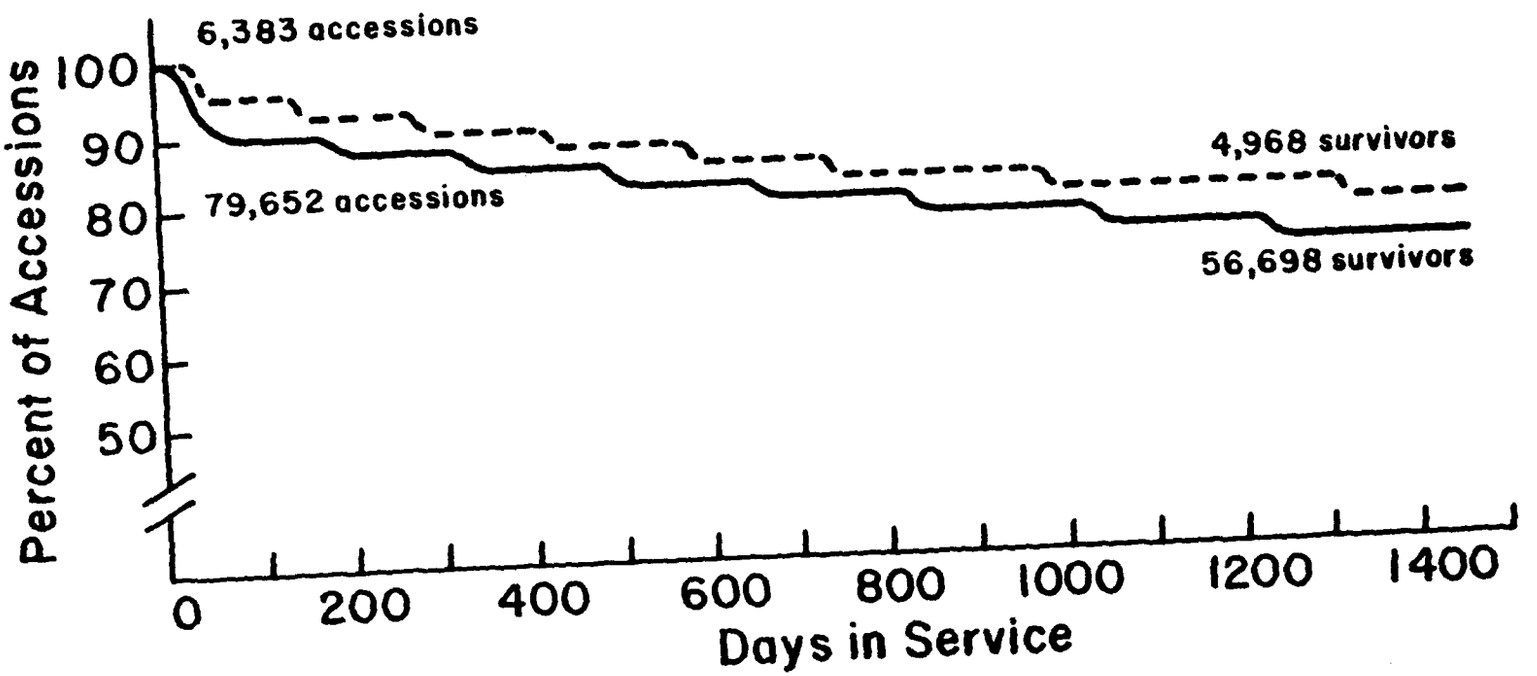
Propositions involving distributions will be tested using survival analysis techniques, and the tests for distinguishing factors for voluntary and involuntary separators will use stepwise multivariate discriminant analysis. Turnover curves, which are equivalent to survival curves in the survival literature, will be plotted with number of individuals in service on the Y-axis and time in days on the X-axis. The involuntary turnover curves start with all accessions at date of entrance whereas the voluntary curve commences with just survivors on the Y-axis. The distributional differences between the curves are tested using the Gehan Wilcoxon Generalized Test, Logrank Test, and the Likelihood Ratio Test (Lee, 1980.) These techniques have been used extensively in biomedical research and are particularly pertinent to investigating turnover over a period of time (see for example, Sullivan, et al., 1975; Bonadonna, et al., 1976; and Hart, et al., 1977). A Chi-Square statistic is used to test for aggregate turnover differences between the two turnover groups. Stepwise multivariate discriminant analysis has been used in past turnover research (Wanous, 1979; Stumpf and Dawley, 1981) and is being used here to distinguish differences between the dependent variable categories with a set of discriminating variables (Klecka, 1980; Dixon, 1981).

Results

To investigate the first research question and supporting propositions dealing with the involuntary turnover of entrants and reentrants, the results of the survival analysis are presented in Figures 7.2 and

Figure 7.2

FOUR YEAR INVOLUNTARY TURNOVER CURVES FOR ORGANIZATIONAL ENTRANTS AND REENTRANTS



volunteer turnover. Race and sex have demonstrated mostly inconclusive relationships with minority social status tending to be negatively related to involuntary turnover (Price, 1977). General organizational commitment has been a consistently positive predictor of staying in organizations and the entry commitment level is measured by the term of enlistment which ranges from 2 to 6 years of service. Entry individual-organizational fit is a dichotomous measure indicating whether waivers were required or if all the entrance requirements were met. Similar variables using weighted application items were used by Cascio (1976), but entry fit between the individual and organization is primarily an unstudied variable that may be useful in predicting turnover. Socio-economic conditions are represented in this study by geographic location which is admittedly a gross surrogate, categorical variable which represents general economic conditions. It was measured by using one of six Navy recruiting areas (e.g., southeast, mid-atlantic, north-central, south-central, pacific/mountain or northeast with areas outside of the continental U.S. considered as missing data for this analysis).

Based upon the relevance of work-related and performance variables found in previous reviews and research (Mobley, 1982; Stumpf and Dawley, 1981; Bluedorn, 1982; Wanous and Stumpf, 1979; Price and Mueller, 1981), several previous work and performance factors were used for predicting reentrant turnover. These work-related variables are previous training, required training, previous pay and rank/grade, reentry pay and grade, and previous organizational performance.

by the organization. Having survived their commitment, they may leave voluntarily or stay in service. Throughout the testing of the propositions and research questions, this distinction remains constant.

Independent variables. As stated earlier, much of the turnover research has emphasized attitudinal and process variables which have explained limited amounts of variation, but the influence of individual, economic, and work-related variables will be used here because the attitudinal and process measures were not available and could not be acquired. Porter and Steers (1973), Price (1977), Sands (1978), and Mobley, et al. (1979) have found evidence that age is usually a strong negative influence on voluntary turnover. The possibility of a relationship between age and involuntary turnover is being tested here. In this study, age is a continuous variable which ranged from 16 to 46 years for the entrants and 18 to 52 years for the reentrants. Research on the effects of education and job aptitude has produced mixed results and indicates that further investigation of these central predictor variables is required (Price, 1977; Mobley, et al., 1979; Muchinsky and Morrow, 1980). Entry education was measured by the highest year of education with a range from 7 to 17 years for both entrants and reentrants. Aptitude was measured using the scores from the Armed Forces Qualification Test (AFQT). The scores ranged from 1 to 99 for the entrants and 2 to 99 for the reentrants. Level of family responsibility has consistently been used as a predictor of turnover and the results presented in reviews by Porter and Steers (1973) and Muchinsky and Morrow (1980). The finding suggests that family responsibility measured by the number of dependents is positively associated with involuntary turnover and negatively and inconclusively related to

example, Mowday, et al., 1984), an explicit choice was made to reinforce the value of the study by emphasizing the integrative, longitudinal design, multifaceted dependent variable, survival methodology, and large sample size strengths. Another decision made was to use data that supplemented the attitudinal approach that was most visible in the literature, by using individual, demographic, and socioeconomic data usually available to practicing managers in organizational records or archives. The data were acquired from the Department of Defense Manpower Data Center for the FY78 cohort of U.S. Navy enlisted accessions. This data source was chosen because it contained quarterly updated sociodemographic data for 79,652 male and female entrants and also had performance and work-related variables on 6,383 reentrants. This cohort was the most recent that could be completely tracked for four years and was most representative of the period when the U.S. Navy was actively seeking reentrants in a time of volunteer military service and relatively poor national economic conditions. The data provide for support of the research questions and tests of the related propositions.

Dependent variables. The two dependent turnover variables are dichotomous indicators which distinguish between organization-initiated involuntary turnover or survival, and between self-initiated, voluntary turnover or staying. This information was accessed from the cohort files where the determination between voluntary and involuntary turnover was made. These distinctions are considered relevant because the literature has forcefully recommended better definition of the turnover variable since Schuh's (1967) and Muchinsky's (1978) discussion of significant research issues. Organizational entrants and reentrants can either survive their commitment or they will be prematurely terminated

conducting two comparisons. To answer the research question, individual and economic factors that predict reentrant involuntary turnover (FCB) must be compared with individual economic, and previous work-related factors that predict the involuntary turnover of reentrants (GCB). This comparison will provide a basis for determining the advantage of utilizing prior organizational experiences of organizational reentrants to predict involuntary turnover. Second, individual and economic factors that predict reentrant voluntary turnover (FCD) must be compared with individual, economic, and previous work-related factors that predict the voluntary turnover of reentrants (GCD). This comparison will provide a basis for determining the advantage of utilizing prior-organizational experiences and personnel data for organizational reentrants to predict involuntary and voluntary turnover. The propositions supporting the third research question are:

Proposition V: The addition of previous work-related factors to the individual and economic models that predict the involuntary turnover of organizational reentrants will improve the prediction of organizational reentrant involuntary turnover.

Proposition VI: The addition of previous work-related factors to the individual and economic models that predict the voluntary turnover of organizational reentrants will improve the prediction of organizational reentrant voluntary turnover.

Data and Methods

One limitation of this research is the choice not to perform a cross validation study; however, given the failure of recent within or between validation studies to produce consistent results (e.g., for

Second, the set of individual and economic factors that predict the voluntary turnover of organizational entrants (EAD) must be compared with the individual and economic factors that predict the voluntary turnover of organizational reentrants (FCD). This comparision will enable the determination of differences in predictors of organizational entrant and reentrant voluntary turnover in addition to the determination of distinctive voluntary predictors that are evident in both groups.

The propositions related to the second research question are:

Proposition III: The individual and economic factors that predict the involuntary turnover of organizational reentrants will likely be different from the individual and economic factors that predict the involuntary turnover of organizational entrants; yet there will likely be common predictors of involuntary turnover for both entrants and reentrants.

Proposition IV: The individual and economic factors that predict the voluntary turnover of organizational reentrants will be different from the individual and economic factors that predict the voluntary turnover of organizational entrants; yet there will likely be common predictors of voluntary turnover for both entrants and reentrants.

Research Question #3:

Are there previous work-related factors from the earlier organizational experiences of reentrants that will improve the prediction of their turnover?

The need to explore additional factors that might improve the prediction of the turnover of organizational reentrants suggests

survives his or her voluntary commitment or is prematurely terminated by the organization (involuntary turnover); and once he or she has survived, he or she either stays or chooses to leave (voluntary turnover). The propositions related to the first research questions are:

Proposition I: The involuntary turnover of organizational reentrants will likely be distributed differently, and be less than, the involuntary turnover of organizational entrants.

Proposition II: The voluntary turnover of organizational reentrants will likely be distributed differently, and be less than, the voluntary turnover of organizational entrants.

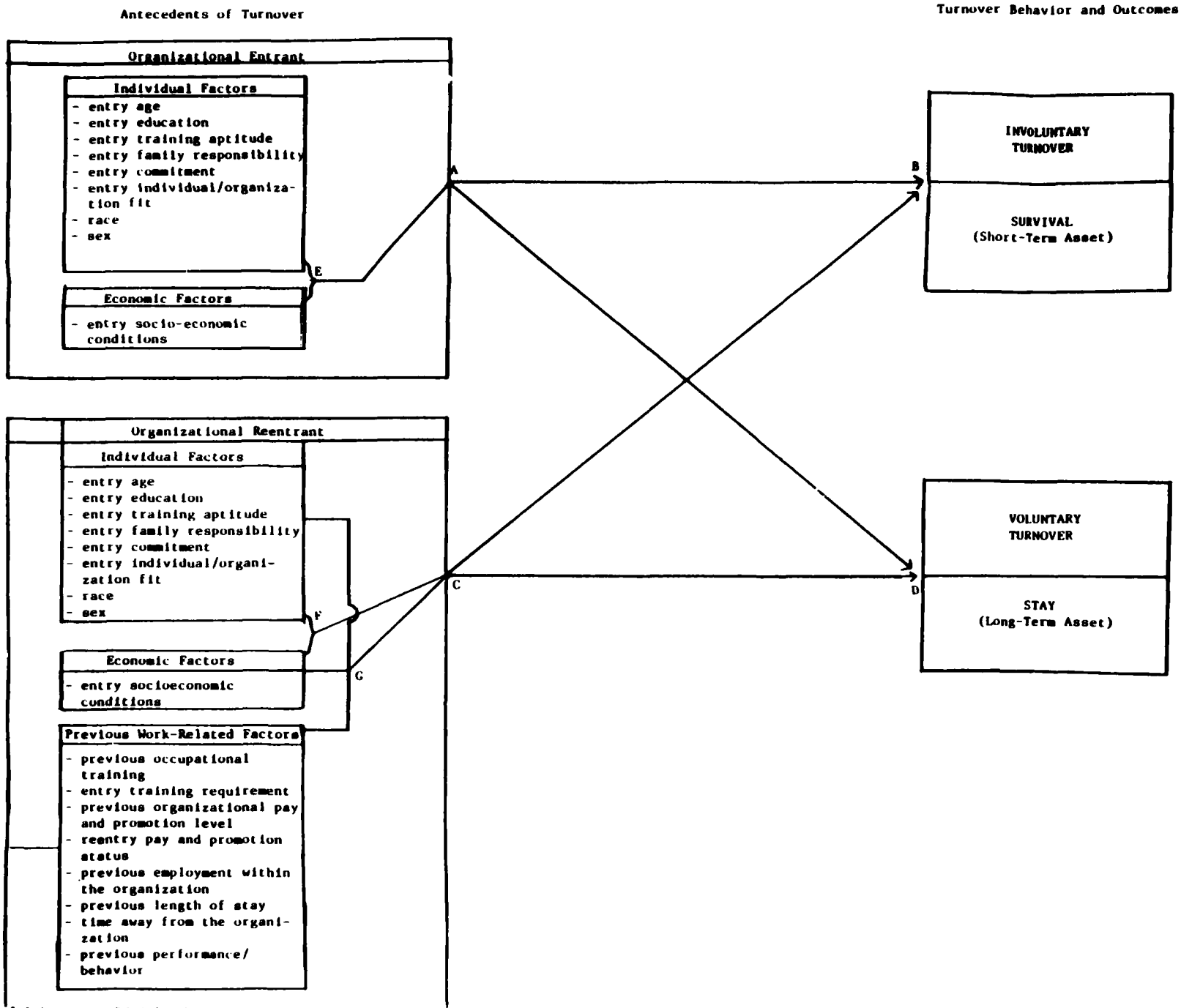
Research Question #2:

The general question is whether or not the individual and economic factors that predict the turnover of organizational entrants are different from the individual and economic factors that predict the turnover of organizational reentrants? In particular:

Part I. Are there distinctive individual and economic predictors of involuntary turnover that are common to both entrants and reentrants; and are there distinctive individual and economic predictors of voluntary turnover that are common to both entrants and reentrants? Individual and economic factors that predict the involuntary turnover of organizational entrants (EAB) will be compared with the individual and economic factors that predict the involuntary turnover of organizational reentrants (FCB). The references are again with respect to Figure 1 and simply extend the AB vs. CB tests somewhat. This comparision will enable the determination of differences in predictors of organizational entrants and reentrant involuntary turnover in addition to determination of distinctive involuntary predictors evident in both groups.

Figure 7.1

Research Design for Study of Involuntary/Voluntary Turnover of Organizational Entrants/Reentrants



turnover, and a positive effect on entrants. Education and aptitude have significant negative influences on entrant and reentrant involuntary turnover. Marital status has a significant negative association with reentrant turnover, but has no relationship with entrant turnover. Minority racial status is a negative discriminating factor for entrant turnover, but is not related to reentrants. Marital status influences reentrant but not entrant involuntary turnover. Individual-organizational fit measured by adverse waiver status is positively associated with both categories of involuntary leavers. Entrant males are more likely to be separated involuntarily. Socioeconomic conditions reflected by recruiting area discriminates for entrants, but not re-entrants. Entrants from the north, south-central, and mid-west areas are more likely to be classified as involuntary separatees whereas re-entrants from these same areas are not. Entry commitment measured in greater years is generally a negative influence on turnover; results here indicate that reentrants with a four-year commitment are more likely to leave involuntarily than others with shorter or larger commitments; entrants with a four-year commitment are less likely to leave voluntarily than others. Overall, the results support Proposition III that common and different predictors of entrant and reentrant involuntary turnover exist, but the level of explanation represented by the canonical correlation is low probably because of the extensive size of the cohort and the need to use additional indicators of turnover.

Proposition IV which posits common and different predictors for entrant and reentrant voluntary turnover was tested using discriminant analysis and the results are presented in Table 7.4. Age is negatively related to voluntary turnover, but marital status and number of depen-

Table 7.4

Comparison To Investigate Differences
In Predictors of Organizational Entrant
and Reentrant Voluntary Turnover (Proposition IV)

Organizational Entrant
Basic Voluntary Turnover Model

Groups[a]	Function
Stayer	-0.29
Voluntary Turnover	0.42
Variables[bc]	
TRM4YEAR	-2.06
Race	-0.49
Dependents	-0.35
Rec Area 3	-0.24
Sex	0.20
Rec Area 5	0.18
Education	0.07
Age	-0.05
Aptitude	-0.02
Canonical Correlation	0.33

Group	Percent Correct	Number of Cases Classified Into Each Group	
		Voluntary Turnover	Stayer
Voluntary Turnover	37.3	1,693	2,846
Stayer	86.6	889	5,742
Total	66.6	2,582	8,588

Organizational Reentrant
Basic Voluntary Turnover Model

Groups[a]	Function
Stayer	-0.33
Voluntary Turnover	0.67
Variables[bc]	
TRM2YEAR	2.19
TRM3YEAR	1.64
Sex	-0.42
Marital Status	-0.33
TRM4YEAR	0.26
Rec Area 5	0.24
Rec Area 7	0.23
Age	-0.07
Canonical Correlation	0.43

Group	Percent Correct	Number of Cases Classified Into Each Group	
		Voluntary Turnover	Stayer
Voluntary Turnover	56.5	873	673
Stayer	79.8	640	2,529
Total	72.2	1,513	3,202

[a] Canonical discriminant function evaluated at group means, i.e., function centroid.

[b] Standardized canonical discriminant function coefficients.

[c] $p \leq .01$.

dents have mixed effects. Race, education, aptitude, entry commitment, and sex influences are inconclusive predictors of voluntary turnover, but recruiting area tends to discriminate between entrants and reentrants with north-central entrants voluntarily leaving and southeasterners staying. The canonical correlations for voluntary turnover is much higher than for involuntary turnover with the model improving the classification of voluntary stayers and leavers.

The third research question and supporting Propositions V and VI focus upon reentrant turnover and related, previous work experiences to improve the prediction of turnover. Table 7.5 presents the results of the stepwise multivariate discriminant analysis which examines basic reentrant involuntary turnover with the extended involuntary model. Additionally, Morrison's (1969) Chi-Square test for classification evaluation criteria was used to test the improvement of the extended over the basic reentrant involuntary model with the results presented in Table 7.5b. The results of the extended discriminant function in Table 7.5a profiles the reentrant most likely to be involuntarily separated. Low aptitude, less education, single, caucasian with prior U.S. Army service, administrative training, previous performance/behavior problems, low previous paygrade, required retraining, and short time out of service are characteristics associated with higher levels of involuntary separation. Table 7.5b presents the Chi-Square test of predictive improvement for the extended over the basic model of reentrant involuntary turnover which shows a comparison of the upper two and lower two rows to be statistically significant ($P \leq .0001$). This indicates that the extended model with work-related factors improves prediction of reentrant involuntary turnover.

TABLE 7.5

7.5a Comparison To Investigate Improvement in Prediction of Organizational Reentrant Involuntary Turnover (Proposition V)

Organizational Reentrant Basic Involuntary Turnover Model	
Groups[a]	Function
Survivor	-0.13
Involuntary Turnover	0.45
Variables[bc]	
TRM5YEAR	-2.17
TRM3YEAR	-1.33
TRM2YEAR	-1.14
Marital Status	-0.80
Waiver Status	0.63
Education	-0.14
Age	-0.13
TRM6YEAR	-0.61
Aptitude	-0.01
Canonical Correlation	0.23

Group	Percent Correct	Number of Cases Classified Into Each Group[d]	
		Involuntary Turnover	Survivor
Involuntary Turnover	1.2	17	1,344
Survivor	99.8	8	4,695
Total	77.7	25	6,039

Organizational Reentrant Extended Involuntary Turnover Model	
Groups[a]	Function
Survivor	-0.16
Involuntary Turnover	0.72
Variables[bc]	
Performance/Behavior	1.06
TRM5YEAR	-0.96
Previous Army Service	0.83
Training Required	0.47
Previous Pay and Promotion	-0.40
Race	-0.36
TRM2YEAR	-0.32
Previous Admin. Occ.	0.26
Marital Status	-0.20
Education	-0.09
Aptitude	-0.01
Time Away	0.01
Canonical Correlation	0.33

Group	Percent Correct	Number of Cases Classified Into Each Group[d]	
		Involuntary Turnover	Survivor
Involuntary Turnover	21.9	189	673
Survivor	95.7	165	3,629
Total	82.0	354	4,302

[a] Canonical discriminant function evaluated at group means, i.e., function centroid.

[b] Standardized canonical discriminant function coefficients.

[c] $p \leq .01$.

[d] Morrison (1969) X^2 test results in Table 5b below

7.5b The Chi-Square Test of Predictive Improvement of The Extended Involuntary Model Over That of The Basic Involuntary Model

Chi-Square Test Between Lower Cells of Each Model

$X^2 = 184.1$, 1 DF; $p \leq .0001$

Chi-Square Test Between Upper Cells of Each Model

$X^2 = 268.1$, 1 DF; $p \leq .0001$

7.6a Comparison To Investigate Improvement in Prediction of Organizational Reentrant Voluntary Turnover (Proposition VI)

Organizational Reentrant Basic Voluntary Turnover Model	
Groups[a]	Function
Stayer	-0.33
Voluntary Turnover	0.67
Variables[bc]	
TRM2YEAR	2.19
TRM3YEAR	1.64
Sex	-0.42
Marital Status	-0.33
TRM4YEAR	0.26
Rec Area 5	0.24
Rec Area 7	0.23
Age	-0.07
Canonical Correlation	0.43

Group	Percent Correct	Number of Cases Classified Into Each Group[d]	
		Voluntary Turnover	Stayer
Voluntary Turnover	56.5	873	673
Stayer	79.8	640	2,529
Total	72.2	1,513	3,202

Organizational Reentrant Extended Voluntary Turnover Model	
Groups[a]	Function
Stayer	-0.34
Voluntary Turnover	0.70
Variables[bc]	
TRM2YEAR	2.11
TRM3YEAR	1.61
Sex	-0.35
Previous Army Service	0.31
Rec Area 5	0.24
Marital Status	-0.24
Rec Area 7	0.24
TRM4YEAR	0.22
Previous Tech. Occ.	-0.18
Age	-0.03
Previous Length of Stay	-0.01
Canonical Correlation	0.44

Group	Percent Correct	Number of Cases Classified Into Each Group[d]	
		Voluntary Turnover	Stayer
Voluntary Turnover	59.2	736	508
Stayer	78.7	543	2,008
Total	72.3	1,279	2,516

[a] Canonical discriminant function evaluated at group means, i.e., function centroid.
[b] Standardized canonical discriminant function coefficients.
[c] $p \leq .01$.
[d] Morrison (1969) X^2 test results in Table 6b below

7.6b The Chi-Square Test of Predictive Improvement of The Extended Voluntary Model Over That of The Basic Voluntary Model

Chi-Square Test Between Lower Cells of Each Model

$X^2 = .97$, 1 DF; NS

Chi-Square Test Between Upper Cells of Each Model

$X^2 = 2.4$, 1 DF; $p \leq .01$

Tables 7.6a and 7.6b present the results of the discriminant and Morrison (1969) analysis tests for Proposition VI for reentrant voluntary turnover. The extended model does not improve prediction over the basic model; therefore Proposition VI is not supported. Previous work-related factors improved the prediction of involuntary turnover for reentrants, but the extended models did no better than the individual model in predicting reentrant voluntary turnover.

Overall, the results of the analysis presented in Figures 7.2 and 7.3 and Tables 7.1 through 7.6 supported Propositions I and II (Research Question 1), Propositions III and IV (Research Question 2) and Proposition V, but not Proposition VI (Research Question 3).

Discussion and Conclusions

This study has attempted to progress beyond traditional approaches to turnover by focusing upon the voluntary (individual initiated) and involuntary (organization initiated) turnover of organizational entrants and reentrants over a four-year period using approximately 86,000 individual cases. The investigations of Propositions I and II yielded similar distributions, but overall statistically significant and dramatic results for entrant and reentrant involuntary turnover. Almost one-third of the total involuntary turnover for entrants and reentrants occurred in the first 100 days of service. The aggregate-level differences between the involuntary turnover of entrants and reentrants was 6.6 percent and the difference for voluntary turnover between the two groups was 7.7 percent. The results of the analysis also demonstrated that the voluntary and involuntary turnover of reentrants is less than for entrants and that different predictor variables are associated with

turnover of entrants and reentrants. However, there were also some common predictors of entrant and reentrant turnover. Further, it was found that prior work-related factors improved the prediction of reentrant involuntary turnover, but not voluntary leaving. Taken together, the findings of the multiple patterns and tests appear to have different implications for a theory of turnover, research, and practitioners because of the assumptions governing turnover and the cost/benefit questions for managerial strategies related to turnover.

In terms of theory development of the individual and economic variables included in the study, only entry education, entry aptitude, and entry individual-organizational fit appear to have implications for a general model of involuntary turnover. Factors distinguishing between voluntary stayers and leavers were entry age, entry family responsibility, and economic condition indicators. These variables suggest that there may be general factors such as economic conditions and family responsibility which correspond to findings from previous research (Porter and Steers, 1973; Muchinsky and Morrow, 1980; Price and Mueller, 1981). Previous work-related factors improve the prediction of involuntary, but not voluntary turnover. However, they give no information about available opportunities in the environment. For the reentrant, more technical training was associated with stayers, contrary to earlier findings (Price and Mueller, 1981).

Overall, the individuals who involuntarily separated tended to be less educated, have less aptitude, and deviate more from entry standards. Work-related factors for involuntarily separated reentrants suggested that they were trained in less technical occupations, required further training, had poor previous performance records, and had been

employed in dissimilar organizational roles. Voluntary separators tended to be younger, have fewer family responsibilities, and be affected by socioeconomic conditions. Generally, the findings of the study support past research and appear to support the concept of a general model of turnover, but some of the other results bring many traditional assumptions concerning turnover into question.

Since this study did not have access to perceptual data on turnover, no interpretations or conclusions concerning their association with turnover can be made; however, the results do suggest that the value of longitudinal behavioral research can be improved if archival personnel records are supplemented with attitudinal data. The results of past research has shown that perceptual or processual studies of turnover explain little to moderate levels of variation in turnover behavior, and to supplement these essential approaches, this study has been able to test the distributional and aggregate differences in voluntary and involuntary turnover for organizational entrants and reentrants using individual, socioeconomic, and work-related variables with only moderate levels of variation explained.

The emerging conclusions that correspond to the purposes of this study are that longitudinal research is an important approach for understanding the distribution of turnover behavior over time and the aggregate difference between categories and definitions of turnover in a common cohort. Measures of turnover require further explication to capture not only the behavior, but the attitudinal concomitants of the behavior. Organizational and work-related variables improve prediction of certain classes of turnover behavior or outcomes, and these results suggest that the concept of turnover requires further theoretical devel-

opment to crystallize the effects of the context on turnover behavior. For example, the results presented here indicate that turnover behavior is influenced by individual, socioeconomic, and work-related variables; however, the effects of organizational demography, group-interpersonal, technological, and environmental factors are not clearly understood.

Recent turnover literature has begun to argue that some turnover may not be dysfunctional, which implies that a turnover rate could reach an optimal point if the organizational and managerial perspective is taken (Abelson and Baysinger, 1984; Dalton, Todor, and Krackhardt, 1982; Dalton and Todor, 1979). In any event, the unanswered turnover process question still remains. Is turnover organization-specific or can a general model of turnover common to individuals be derived and applied in different managerial and organizational contexts? Some would argue that a macro-organizational turnover model is a logical step (Abelson and Baysinger, 1984), but a truly optimal model would address individual and organizational functional and dysfunctional behaviors and consequences. That is, there may exist a point at which dysfunctional individual consequences may directly affect organizational effectiveness and costs. General equilibrium points for turnover cannot be measured precisely in terms of costs and benefits across organizations and individuals without some acceptable referent model which specifies individual, organizational, technological, and environmental cause and effect linkages. This theory-based evaluation would also have to address explicitly the limitations of turnover measures because of linearity assumptions and the value of cross-sectional studies.

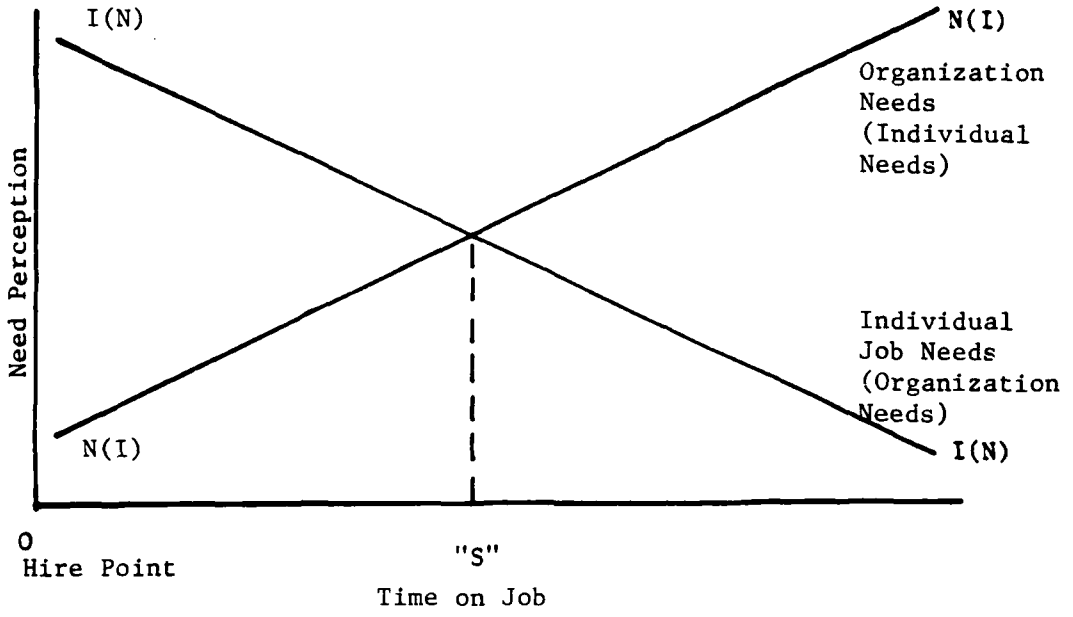
An important need of the turnover literature is to be guided by a common theoretical foundation. Turnover is, of course, a dynamic

process in which time in a "state" is an integral factor. This study has recognized this by examining survival curves and yet the curves merely record "switch points" from one category to another. A time-based theory would be able to identify and estimate the separate influences of individuals and the organization. Figure 7.4 shows such a model. Organizational entrants may begin with high expectations and job needs and gradually lower these as they perceive that organizational needs are far less. Before Time OS has elapsed, some people may leave voluntarily because of this discrepancy, yet after OS they are more likely to stay if they realize that their value to the organization (shown on N(I) is greater than their own needs (shown on I(N)). Also, if the individual needs path shifts downward due to external stimuli like greater unemployment and lower relative wage rates, then the organization is again the best choice both after the OS time and even before OS. At the same time, the model can be viewed as an involuntary turnover model if one simply changes the time path labels. Fewer entrants are forced out if the difference between their needs and the organization is greater, which is true before OS and not true after OS.

Ideally, one would be able to monitor the determinants of the individual and organizational time paths. Instead, what we and other researchers have done is to examine a series of "S" points for different people. What is lost is an ability to precisely say if "S" is less for a change in organizational or individual needs. That is, a "tightening" of entry screening would shift like "N" upwards and predict less voluntary turnover (and more involuntary turnover), but the same thing would occur if individuals lowered their job needs. The policy implications of the two shifts are sharp and yet without further data we cannot identify the cause of such shifts.

Figure 7.4

A Voluntary (and Involuntary) Turnover Model



This diagram is an adaptation of the collective bargaining model of British economist Sir John Hicks (Wage Theory, Oxford, 1965).

In addition to the longitudinal time-related issues and findings presented here, other recent research has found that the customary focus on turnover as a linear process may be incomplete. For instance, the longitudinal analysis performed here supported Sheridan and Abelson's (1983) results which found discontinuities in the transition from retention to termination even though their sample only consisted of nurses who voluntarily terminated. The findings in this study related to reentrant turnover supported the concept of discontinuous turnover, especially in the early part of the employment period. Since neither a general organizational-managerial nor individual turnover model or theory has been fully developed, or the consitituent elements systematically validated, it would appear that the results from this study emphasize the inherent theoretical complexity of explaining turnover behavior even with longitudinal, multivariate and well circumscribed concepts such as turnover. It would appear that a systematic propositional framework encompassing recent research findings is needed to provide an integrated, acceptable approach to defining the components of and paths to a theory of turnover.

Research and Managerial Implications

Voluntary and involuntary turnover appear to exhibit similar, but statistically and significantly different distributional and aggregate patterns over a four-year period. However, questions of discontinuity in the process and attitudinal concomitants of turnover require more precise and continuous measurement methods to capture linkages between external/environmental influences, organizational work-related variables, and individual turnover over a period of time. The results

m a specific cohort and organizational framework presented here respond to findings from other organizational contexts, but the dings and additional insights developed sharpen the focus on the stion of organizational-specific versus a general model of turnover. er these questions are resolved, another issue that needs to be ressed in follow-up research is whether or not all turnover is functional. Is it a naturally occurring, human behavior dynamic that resents mutual individual-organizational adjustments that just happen have some significant cost implications for some types of managers, ., a high wage/low turnover strategy or a low wage/high turnover ategy? A further question is, what is the best turnover model that be derived and could it be used effectively for individuals and anizations even if it was a perfect predictor of behavior? Recent earch, including this study, demonstrates that more integration in ory building would be useful.

A strong managerial implication of the study results is the use of sonnel records and archives to predict or understand organizational nover. Demographic, economic, and attitudinal data may be collected m organizational members, but the end result of improved prediction turnover may not be as relevant or useful as environmental and/or nomic forces evolve over time. Different contingencies may require ticularistic knowledge, projections, and decisions not easily derived m archives or past trends in turnover. Since the most general models turnover tend to focus on the individual as the unit of analysis, ctitioners may have to emphasize the organizational level of analysis generate models useful for their own managerial purposes.

One final point concerns the use of nonparametric survival analysis methods to study what is essentially a dynamic and changing process. The procedures used here were mainly nonparametric, except for the discriminant analyses; but if one is to take full advantage of the availability of a rich data source like the Defense Manpower Data Center, then a future goal may be to consider the modeling of the survival function itself. If one were to assume, say, an exponential distribution of "wait times," then one could predict the phenomenon such as the expected time to being involuntarily separated for a young high-school dropout vs. high-school graduate. Stephenson (1982) provides an example of an approach that could be used to apply the concepts discussed here.

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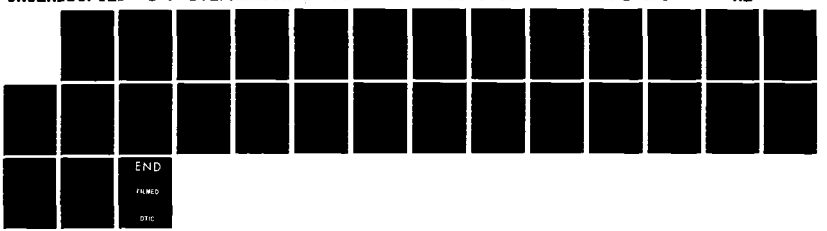

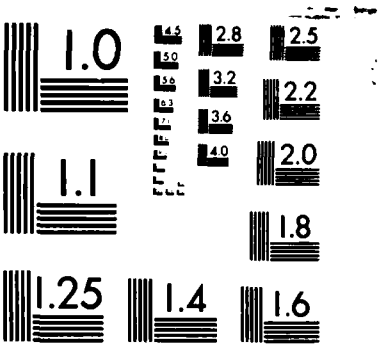

REFERENCES

Abelson, M. A., and Baysinger, B. D. Optimal and dysfunctional turnover: Toward an organizational level model, Academy of Management Review, 9 (1984), pp. 331-341.

Bluedorn, A. C. The theories of turnover: Causes, effects and meaning. In S. B. Bacharach (Ed.) Research in the Sociology of Organizations. Greenwich, CT: JAI Press, 1982, pp. 77-128.

Bonadonna, G., Brusamolino, E., Valagussa, P., Rossi, A., et al. Combination Chemotherapy as an Adjuvant Treatment in Operable Breast Cancer, The New England Journal of Medicine, 294 (8) (1976), pp. 405-410.

Cascio, W. F. Turnover, biographical data, and fair employment practice, Journal of Applied Psychology, 61 (1976), pp. 576-580.

Dalton, D. R., and Todor, W. D. Turnover turned over: An expanded and positive perspective, Academy of Management Review, 4 (1979), pp. 225-235.

Dalton, D., Todor, W., and Krackhardt, D. Turnover overstated: The functional taxonomy, Academy of Management Review, 7 (1) (1982), pp. 117-123.

Dixon, W. J., Brown, M., Engelman, L., Frane, J., and Jennrich, R. BMDP Statistical Software. London: University of California Press, 1983.

Dreher, G. F. The role of performance in the turnover process, The Academy of Management Journal, 25 (1) (1982), pp. 137-147.

Ellison, David R. Predicting involuntary and voluntary turnover of organizational entrants and reentrants, Ph. D. dissertation, The Pennsylvania State University, May 1984.

Hart, J. S., George, S. L., Frei, E., Bodney, G. P., Nickerson, R. C. and Freireich, E. J. Prognostic significance of pretreatment proliferative activity in adult acute leukemia, Cancer, 39 (1977), pp. 1603-1617.

Klecka, W. R. Discriminant analysis. London: Sage Publications, 1980.

Lee, E. T. Statistical methods for survival data analysis. Belmont, CA: Lifetime Learning Publications, 1980.

Mobley, W. H., Griffeth, R. W., Hand, H. H., and Meglino, B. M. Review and conceptual analysis of the employee turnover process, Psychological Bulletin, 86 (1979), pp. 493-522.

Mobley, W. H. Some unanswered questions in turnover and withdrawal research, Academy of Management Review, 7 (1) (1982), pp. 111-116.

Morrison, D. G. On the interpretation of discriminant analysis, Journal of Marketing Research, 6 (1969), pp. 156-163.

Mowday, R. T., Koberg, C., and McArthur, A. W. The psychology of the withdrawal process: A cross validational test of Mobley's intermediate linkages model of turnover in two samples, Academy of Management Journal, 27 (1984), pp. 79-94.

Muchinsky, P. M. Methodological/interpretive issues in employee turnover research. Paper presented at the 38th annual meeting of the Academy of Management, San Francisco, CA., 1978, (August 9-13).

Muchinsky, P. M., and Morrow, P. C. A Multidisciplinary model of voluntary employee turnover, Journal of Vocational Behavior, 17 (1980), pp. 263-290.

Porter, B. M., and Steers, R. M. Organizational, work, and personal factors in employee turnover and absenteeism, Psychological Bulletin, 80 (1973), pp. 151-176.

Price, J. J. The Study of Turnover Ames, IA: Iowa State University Press, 1977.

Price, J. L., and Mueller, C. W. A casual model of turnover for nurses, Academy of Management Journal, 24 (3) (1981), pp. 543-565.

Sands, W. A. Enlisted personnel selection for the U.S. Navy, Personnel Psychology, 31 (1978), pp. 63-70.

Schuh, A. The predictability of employee tenure: A review of the literature, Personnel Psychology, 20 (1967), pp. 133-152.

Sheridan, J. E., and Abelson, M. A. Cusp catastrophe model of employee turnover, Academy of Management Journal, 26 (1983), pp. 418-436.

Stephenson, S. P., Jr. A turnover analysis of joblessness for young women, Research in Labor Economics, 5 (1982), pp. 279-318.

Stumpf, S. A., and Dawley, P. K. Predicting voluntary and involuntary turnover using absenteeism and performance indices, Academy of Management Journal, 24 (1) (1981), pp. 148-163.

Sullivan, M. P., Humphrey, G. B., Vietti, T. J., Haggard, M. E., and Lee, E. Superiority of contentional intrathecal methotrexate therapy with maintenance over intensive intrathecal methotraxate therapy, unmaintained, or radiotherapy (2000-2500 rads. tumor dose) in Treatment for meningeal leukemia, Cancer, 35 (4) (1975), pp. 1066-1073.

Wagner, W. G., Pfeffer, J., and O'Reilly, C. A., III. Organizational demography and turnover in top management groups, Administrative Science Quarterly, 29 (1984), pp. 74-92.

Wanous, J. P., Stumpf, S. A., and Bedrosion, H. Job survival of new employees, Personnel Psychology, 32 (1979), pp. 651-662.

APPENDIX A

Analysis of Military and Civilian Wages with Respect to Career Decisions and Time Out of the Navy

This appendix includes analyses of the military and civilian wages of a sample of 3,369 Navy enlisted men. This sample is a subsample of the sample used in Chapters 4 and 5 of this report.

This appendix includes three sets of analyses:

- A descriptive analysis that includes the average annual wages for selected categories of individuals. In Table A-1 this analysis is presented for the total period of study (that is, calendar years 1974 to 1982). In Tables A-2 through A-10 this analysis is presented for specific calendar years.

- A set of regression analyses that analyzes the relationship between specific career decisions and military wages, civilian wages, job, and selected demographic variables. These analyses, which are presented in Tables A-11 through A-13, use the same variable definitions that were used in Chapter 4. These analyses complement those presented in Chapter 4.

- A set of regression analyses that analyses the relationship between time out of the Navy and military wages, civilian wages, job, and selected demographic variables. These analyses, which are presented in Table A-4, complement the analyses presented in Chapter 5.

Wage data for these analyses were obtained from the Social Security Administration. The analyses were not received until this project was almost completed. Therefore, the limited time precluded the preparation of a detailed description of the results. A brief description of the most important findings is presented here.

Analysis of average wages for 1974-1982 (Table A-1)

- Average annual military wages were higher than average annual civilian wages.[a]

- For both military and civilian wages, whites earned more than non-whites.

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[a]Note that these are average annual wages. Military wages were earned for the entire year; civilian wages may have been earned for less than an entire year.

- The higher the educational level, the higher were the average wages. The difference between high school graduates and high school dropouts was greater than the difference between high school graduates and those with higher levels of education.

- The lowest wages were earned by individuals in the military/non-category. The highest wages were earned by those in the craft and technical jobs.

Comparison of average wages for specific calendar years (Tables A-2 to A-10)

- Even after wages were adjusted for inflation, average wages increased over time.[a] This difference was greatest after 1976.

- Civilian wages increased over time at a faster rate than military wages.[b]

- For all years average annual military wages were greater than average annual civilian wages.[b]

- For all years the income of whites was higher than that for non-whites.

Regression analyses of career decisions (Tables A-11 to A-13)

- Whites were more likely than non-whites to be stayers or leavers, rather than reentrants.

- Better educated individuals were more likely to be stayers rather than leavers, and least likely to be reentrants.

- Individuals in the trained occupations were more likely to be stayers than leavers.

- Higher civilian pay was associated with a greater likelihood of being a leaver than a reentrant, and the least likelihood of being a stayer.

- Higher military pay was associated with a greater likelihood of being a reentrant than a leaver, and the least likelihood of being a stayer.

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[a]This increase most likely reflects the effect of work experience. Wages increased after more years in the labor market.

[b]Note that these are average annual wages. Military wages were earned for the entire year; civilian wages may have been earned for less than an entire year.

Regression analyses of time out of the Navy (Table A-14)

- Whites stayed out longer than non-whites.
- Better educated individuals stayed out longer.
- Higher military pay was associated with a shorter time out of the Navy.
- Higher civilian pay was associated with a shorter time out of the Navy.

TABLE A-1

Average Annual Wages[a] by Type of Wages[b] by Selected Variables

Variable / Value \ Employment Status	Average Annual Military Wages Mean	n	Average Annual Civilian Wages Mean	n
Race				
White	3,269	3,000	3,222	3,000
Non-white	2,886	369	2,797	369
Education				
Less than High School	2,872	281	2,794	281
High School	3,257	2,817	3,211	2,817
More than High School	3,284	271	3,203	271
Job Classification				
Military/non-occupational	2,479	380	2,411	380
Electronics	3,242	923	3,197	923
Technical	3,654	202	3,599	202
Support	3,223	345	3,139	345
Mechanical	3,335	1,236	3,291	1,236
Crafts	3,410	283	3,368	283
Entry Year				
1973	3,201	488	3,143	488
1974	3,143	997	3,123	997
1975	3,310	1,349	3,300	1,349
1976	3,196	535	2,987	535
Total[c]	3,227	3,369	3,175	3,369

[a]Mean annual wages for calendar years 1974 to 1982 coded in 1972 dollars

[b]Military or Civilian

[c]Mean and frequency for all individuals with this type of wages

TABLE A-2

Average 1974 Income by Employment Status by Selected Variables

Variable / Value \ Employment Status	Military Mean	Military n	Civilian Mean	Civilian n	Mixed Mean	Mixed n
Race						
White	3,569	372	1,338	1,724	2,785	904
Non-white	3,375	32	1,468	188	2,463	149
Education						
Less than High School	3,195	41	738	122	2,695	118
High School	3,565	334	1,308	1,662	2,719	821
More than High School	3,931	29	2,500	128	2,939	114
Job Classification						
Military/non-occupational	3,267	30	1,114	176	2,485	174
Electronics	3,769	91	1,532	571	2,801	261
Technical	3,575	47	1,936	94	2,754	61
Support	3,560	50	1,167	192	2,553	103
Mechanical	3,513	154	1,245	715	2,837	367
Crafts	3,375	32	1,317	164	2,862	87
Entry Year						
1973	3,555	404	3,643	28	2,607	56
1974	-[c]	0	-[c]	0	2,747	997
1975	-[c]	0	1,503	1,349	-[c]	0
1976	-[c]	0	849	535	-[c]	0
Classification						
Reentrant	3,419	62	1,833	18	2,742	62
Stayer	3,875	32	1,654	286	2,864	169
Leaver	3,548	310	1,292	1,608	2,714	822
Total[d]	3,555	404	1,351	1,912	2,740	1,053
	TOTAL SAMPLE (ALL WAGES)		2,049	3,369		

[a] Mean income for calendar year 1974, coded in 1972 dollars

[b] Military, Civilian, or Mixed

[c] No mean reported since frequency was zero

[d] Mean and frequency for all individuals with indicated type of employment

TABLE A-3

Average 1975 Income by Employment Status by Selected Variables

Variable / Value \ Employment Status	Military Mean	Military n	Civilian Mean	Civilian n	Mixed Mean	Mixed n
Race						
White	3,529	1,086	1,898	669	2,568	1,245
Non-white	3,339	130	1,660	106	2,481	133
Education						
Less than High School	3,220	118	1,522	90	2,480	73
High School	3,510	981	1,865	644	2,525	1,192
More than High School	3,786	117	2,634	41	2,974	113
Job Classification						
Military/non-occupational	3,130	115	1,784	139	2,437	126
Electronics	3,617	298	2,057	210	2,617	415
Technical	3,618	102	1,759	29	2,747	71
Support	3,454	130	1,766	77	2,457	138
Mechanical	3,540	463	1,866	262	2,558	511
Crafts	3,435	108	1,552	58	2,504	117
Entry Year						
1973	3,822	382	2,905	84	2,955	22
1974	3,365	834	3,173	156	2,571	7
1975	-[c]	0	-[c]	0	2,553	1,349
1976	-[c]	0	1,322	535	-[c]	0
Classification						
Reentrant	3,486	107	2,408	5	2,667	30
Stayer	3,846	91	1,625	220	2,659	176
Leaver	3,480	1,018	1,750	550	2,542	1,172
Total[d]	3,508	1,216	1,866	775	2,560	1,378
TOTAL SAMPLE (ALL WAGES)			2,742	3,369		

[a] Mean income for calendar year 1975, coded in 1972 dollars

[b] Military, Civilian, or Mixed

[c] No mean reported since frequency was zero

[d] Mean and frequency for all individuals with this type of wages

Average 1976 Income by Employment Status by Selected Variables

Variable / Value \ Employment Status	Military Mean	Military n	Civilian Mean	Civilian n	Mixed Mean	Mixed n
Race						
White	3,539	2,036	3,448	337	2,866	627
Non-white	3,413	213	3,098	61	2,611	95
Education						
Less than High School	3,497	153	3,195	41	2,598	87
High School	3,514	1,909	3,448	310	2,871	598
More than High School	3,679	187	3,213	47	2,757	37
Job Classification						
Military/non-occupational	3,303	188	2,936	94	2,663	98
Electronics	3,593	616	3,607	122	2,946	185
Technical	3,573	150	2,556	9	2,884	43
Support	3,464	224	3,237	38	2,723	83
Mechanical	3,538	870	3,638	116	2,832	250
Crafts	3,522	201	3,526	19	2,873	63
Entry Year						
1973	4,014	294	3,289	97	2,959	97
1974	3,805	750	3,460	163	2,869	84
1975	3,235	1,205	3,391	138	2,000	6
1976	-[c]	0	-[c]	0	2,813	535
Classification						
Reentrant	3,768	82	2,111	9	2,451	51
Stayer	3,840	131	3,623	273	2,735	83
Leaver	3,498	2,036	2,957	116	2,880	588
Total[d]	3,527	2,249	3,395	398	2,832	722
TOTAL SAMPLE (ALL WAGES)			3,362	3,369		

[a] Mean income for calendar year 1976, coded in 1972 dollars

[b] Military, Civilian, or Mixed

[c] No mean reported since frequency was zero

[d] Mean and frequency for all individuals with this type of wages

TABLE A-5

Average 1977 Income by Employment Status by Selected Variables

Variable / Value \ Employment Status	Military Mean	Military n	Civilian Mean	Civilian n	Mixed Mean	Mixed n
Race						
White	3,667	2,122	3,580	510	2,924	368
Non-white	3,524	225	3,140	86	2,655	58
Education						
Less than High School	3,461	141	3,074	68	2,764	72
High School	3,647	2,030	3,666	461	2,920	326
More than High School	3,886	176	2,940	67	2,821	28
Job Classification						
Military/non-occupational	3,472	193	2,946	130	2,649	57
Electronics	3,743	681	3,636	173	3,015	69
Technical	3,693	127	2,455	22	2,887	53
Support	3,537	216	3,203	59	2,571	70
Mechanical	3,664	917	3,925	174	3,000	145
Crafts	3,582	213	4,158	38	3,219	32
Entry Year						
1973	3,961	103	3,467	167	3,055	218
1974	3,958	622	3,509	230	2,745	145
1975	3,657	1,148	3,655	139	_[c]	_[c]
1976	3,179	474	3,367	60	_[c]	_[c]
Classification						
Reentrant	3,774	31	2,667	9	_[c]	_[c]
Stayer	3,887	151	3,749	334	_[c]	_[c]
Leaver	3,636	2,165	3,241	253	2,913	322
Total[d]	3,654	2,347	3,517	596	2,887	426
TOTAL SAMPLE (ALL WAGES)			3,533	3,369		

[a] Mean income for calendar year 1977, coded in 1972 dollars

[b] Military, Civilian, or Mixed

[c] Not released by Social Security Administration because of confidentiality regulations

[d] Mean and frequency for all individuals with this type of wages

Average 1978 Income by Employment Status by Selected Variables

Variable / Value \ Employment Status	Military Mean	Military n	Civilian Mean	Civilian n	Mixed Mean	Mixed n
Race						
White	3,936	1,758	3,840	802	3,568	440
Non-white	3,826	178	3,240	125	3,409	66
Education						
Less than High School	3,741	116	3,582	110	3,527	55
High School	3,930	1,676	3,843	726	3,535	415
More than High School	4,021	144	3,319	91	3,722	36
Job Classification						
Military/non-occupational	3,721	147	3,388	170	3,429	63
Electronics	3,975	599	3,860	229	3,505	95
Technical	4,052	96	2,908	65	3,268	41
Support	3,891	165	3,118	110	3,357	70
Mechanical	3,918	767	4,195	287	3,681	182
Crafts	3,926	162	4,394	66	3,764	55
Entry Year						
1973	4,009	107	3,757	341	3,375	40
1974	3,997	310	3,784	334	3,578	353
1975	3,970	1,049	3,745	192	3,500	108
1976	3,760	470	3,700	60	3,800	5
Classification						
Reentrant	3,783	46	3,765	17	3,443	79
Stayer	4,000	146	3,916	335	4,000	6
Leaver	3,923	1,744	3,670	575	3,561	421
Total[c]	3,926	1,936	3,761	927	3,547	506
TOTAL SAMPLE (ALL WAGES)			3,823	3,369		

[a] Mean income for calendar year 1978, coded in 1972 dollars

[b] Military, Civilian, or Mixed

[c] Mean and frequency for all individuals with this type of wages

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TABLE A-14

Summary[a] of Regression Analyses of Model II
Days Out of the Navy = f (Sociodemographic Characteristics, Job, Pay)

Independent Variable	Model IIA[b]	Model IIB[c]	Model IIC[d]
Intercept	912.81 (4.42)***	950.76 (4.67***)	988.86 (4.42)***
Race-nonwhite	-.089 (-2.37)*	-.098 (-2.59)**	-.102 (-2.64)**
Education less than high school	-.060 (-1.56)	-.070 (-1.83)	-.074 (-1.88)
Education greater than high school	.093 (2.28)*	.093 (2.31)*	.098 (2.35)*
Entry age	-.032 (-.77)	-.029 (-.71)	-.054 (-1.29)
General military job	.047 (.65)	.034 (.48)	-2.574[e] (-.04)
Electronics job	-.052 (-.67)	-.045 (-.59)	-.091 (-1.16)
Technical job	8.180[e] (.144)	.012 (.20)	-.020 (-.34)
Support job	.015 (.20)	.017 (.23)	-.015 (-.19)
Mechanical job	-.059 (-.65)	-.053 (-.58)	-.104 (-1.12)
Crafts job	.011 (.171)	.015 (.24)	-.019 (-.29)
Average military pay	-.126 (-3.22)**	-[f]	-[f]
Average civilian pay	-[f]	-.166 (-4.19)***	-[f]
Ratio $\frac{\text{Average Civilian Pay}}{\text{Average Military Pay}}$	-[f]	-[f]	-.053 (-1.39)
F ratio	2.76	3.43	2.10
r^2	.042	.052	.033
Sample size	706	706	681

[a]Value in parentheses indicates T value

[b]Independent variable for pay is average annual military pay

[c]Independent variable for pay is average annual civilian pay

[d]Independent variable for pay is ratio of (military pay)/(civilian pay)

[e]$X\ 10^{-3}$

[f]Not included in this model

*$.01 \leq p < .05$

**$.001 \leq p < .01$

***$p < .001$

TABLE A-13

Summary[a] of Regression Analyses of Model IC: Reentrants and Leavers[b]
Reentrant = f (Sociodemographic Characteristics, Job, Pay)

Independent Variable	Regression Coefficient
Intercept	-.060 (-.06)
Race-nonwhite	.090 (4.96)***
Education less than high school	.150 (8.21)***
Education greater than high school	-.027 (-1.39)
Entry age	-.025 (-1.26)
General military job	.027 (.72)
Electronics job	-.071 (-1.38)
Technical job	.026 (.78)
Support job	.046 (1.20)
Mechanical job	-.056 (-1.00)
Crafts job	-.051 (-1.41)
Average military pay	.714 (12.89)***
Average civilian pay	-.625 (-11.34)***
F ratio	25.72
R^2	.097
Sample size	2882

[a]Value in parentheses indicates T value

[b]1=Reentrant, 0=Leaver

***p < .001

TABLE A-12

Summary[a] of Regression Analyses of Model IB: Stayers and Leavers[b]
Stayer[b] = f (Sociodemographic Characteristics, Job, Pay)

Independent Variable	Regression Coefficient
Intercept	.669 (9.531)***
Race-nonwhite	-.019 (-1.41)
Education less than high school	-.051 (-3.84)***
Education greater than high school	.035 (2.43)*
Entry age	3.050[c] (.002)
General military job	-.112 (-4.01)***
Electronics job	.182 (4.41)***
Technical job	.029 (1.21)
Support job	.062 (2.15)*
Mechanical job	.119 (2.73)***
Crafts job	.035 (1.27)
Average military pay	-.384 (-4.66)***
Average civilian pay	-.287 (-3.48)***
F ratio	218.97
R^2	.450
Sample size	3229

[a]Value in parentheses indicates T value

[b]1=Stayer, 0=Leaver

[c]Measured as 10^{-5}

*$.01 \leq p < .05$

*** $p < .001$

TABLE A-11

Summary[a] of Regression Analyses of Model IA: Stayers and Reentrants[b]
Stayer[b] = f (Sociodemographic Characteristics, Job, Pay)

Independent Variable	Regression Coefficient
Intercept	.187 (4.08)***
Race-nonwhite	-.081 (-2.48)*
Education less than high school	-.196 (-5.90)***
Education greater than high school	.046 (1.35)
Entry age	.023 (.68)
General military job	-.037 (-.54)
Electronics job	.234 (1.94)
Technical job	-.100 (-1.78)
Support job	-6.831[c] (-0.08)
Mechanical job	.156 (1.32)
Crafts job	.044 (0.73)
Average civilian pay	-.441 (13.72)***
F ratio	35.39
R^2	.387
Sample size	629

[a]Value in parentheses indicates T value

[b]1=Stayer, 0=Reentrant

[c]Measured as 10^{-3}

*$.01 \leq p < .05$

***$p < .001$

TABLE A-10

Average 1982 Income by Employment Status by Selected Variables

Variable / Employment Status / Value	Military Mean	Military n	Civilian Mean	Civilian n	Mixed Mean	Mixed n
Race						
White	4,579	57	4,189	2,832	-[c]	-[c]
Non-white	4,200	15	3,329	353	-[c]	-[c]
Education						
Less than High School	4,450	20	3,973	258	3,000	3
High School	4,531	49	4,084	2,669	4,172	99
More than High School	4,333	3	4,314	258	6,200	10
Job Classification						
Military/non-occupational	4,182	11	3,363	366	2,667	3
Electronics	4,375	8	4,301	856	4,000	59
Technical	4,571	7	3,161	193	-[c]	-[c]
Support	4,500	12	3,416	332	-[c]	-[c]
Mechanical	4,613	31	4,473	1,163	4,976	42
Crafts	4,667	3	4,287	275	4,200	5
Entry Year						
1973	4,688	32	4,215	441	3,733	15
1974	4,364	33	4,022	949	4,000	15
1975	4,286	7	4,207	1,326	4,688	16
1976	-	0	3,804	469	4,440	66
Classification						
Reentrant	4,500	72	2,381	63	2,143	7
Stayer	-	0	4,473	440	4,340	47
Leaver	-	0	4,072	2,682	4,569	58
Total[d]	4,500	72	4,094	3,185	4,321	112
TOTAL SAMPLE (ALL WAGES)			4,110	3,369		

[a] Mean income for calendar year 1982, coded in 1972 dollars

[b] Military, Civilian, or Mixed

[c] Not available because of Social Security Administration/Internal Revenue Service confidentiality regulations

[d] Total for all individuals with this type of employment

TABLE A-9

Average 1981 Income by Employment Status by Selected Variables

Variable / Value \ Employment Status	Military Mean	Military n	Civilian Mean	Civilian n	Mixed Mean	Mixed n
Race						
White	4,107	168	4,156	2,600	4,181	232
Non-white	3,875	16	3,449	334	3,474	19
Education						
Less than High School	4,087	23	3,878	254	3,250	4
High School	4,081	148	4,095	2,453	4,074	216
More than High School	4,154	13	4,084	227	4,613	31
Job Classification						
Military/non-occupational	4,071	14	3,603	360	4,333	6
Electronics	4,060	67	4,123	722	4,187	134
Technical	3,778	9	2,851	181	3,500	12
Support	4,077	13	3,210	319	3,539	13
Mechanical	4,164	73	4,560	1,085	4,269	78
Crafts	4,000	8	4,476	267	3,500	8
Entry Year						
1973	4,192	47	4,304	428	5,000	13
1974	4,146	48	4,176	928	3,667	21
1975	4,044	23	4,080	1,136	4,258	190
1976	3,985	66	3,631	442	3,148	27
Classification						
Reentrant	4,000	79	2,352	54	3,556	9
Stayer	4,319	47	4,242	393	4,192	47
Leaver	4,017	58	4,086	2,487	4,139	195
Total[c]	4,087	184	4,075	2,934	4,128	251
TOTAL SAMPLE (ALL WAGES)	4,080	3,369				

[a] Mean income for calendar year 1981, coded in 1972 dollars

[b] Military, Civilian, or Mixed

[c] Mean and frequency for all individuals with this type of wages

TABLE A-8

Average 1980 Income by Employment Status by selected variables

Variable / Value \ Employment Status	Military Mean	Military n	Civilian Mean	Civilian n	Mixed Mean	Mixed n
Race						
White	4,018	400	4,001	2,076	3,607	524
Non-white	3,943	35	3,391	276	3,103	58
Education						
Less than High School	3,963	27	3,792	211	3,465	43
High School	4,011	364	3,961	1,961	3,522	492
More than High School	4,046	44	3,744	180	4,000	47
Job Classification						
Military/non-occupational	3,900	20	3,547	309	3,039	51
Electronics	4,030	201	4,024	547	3,589	175
Technical	4,143	21	2,758	149	3,313	32
Support	4,039	26	3,357	272	2,681	47
Mechanical	3,987	151	4,317	856	3,716	229
Crafts	3,938	16	4,228	219	4,250	48
Entry Year						
1973	4,100	60	4,015	414	4,357	14
1974	4,058	69	3,958	767	3,932	161
1975	3,981	213	3,879	1,022	3,947	114
1976	3,989	93	3,893	149	3,160	293
Classification						
Reentrant	3,977	88	2,500	40	3,357	14
Stayer	4,128	94	4,054	353	3,700	40
Leaver	3,980	253	3,936	1,959	3,551	528
Total[c]	4,012	435	3,929	2,352	3,557	582
TOTAL SAMPLE (ALL WAGES)			3,876	3,369		

[a]Mean income for calendar year 1980, coded in 1972 dollars

[b]Military, Civilian, or Mixed

[c]Mean and frequency for all individuals with this type of wages

TABLE A-7

Average 1979 Income by Employment Status by Selected Variables

Variable / Value \ Employment Status	Military Mean	Military n	Civilian Mean	Civilian n	Mixed Mean	Mixed n
Race						
White	3,957	912	4,001	1,176	3,594	912
Non-white	3,955	88	3,453	179	3,137	102
Education						
Less than High School	3,806	67	3,986	146	3,294	68
High School	3,959	843	3,967	1,088	3,558	886
More than High School	4,056	90	3,512	121	3,700	60
Job Classification						
Military/non-occupational	3,727	66	3,676	222	3,196	92
Electronics	3,997	374	3,817	312	3,667	237
Technical	4,098	51	2,847	98	3,264	53
Support	3,887	71	3,395	167	3,168	107
Mechanical	3,941	374	4,396	439	3,667	423
Crafts	4,016	64	4,615	117	3,647	102
Entry Year						
1973	4,000	68	4,003	348	3,944	72
1974	4,027	221	3,950	654	3,746	122
1975	3,997	327	3,792	288	3,486	734
1976	3,875	384	3,923	65	3,465	86
Classification						
Reentrant	3,931	87	2,790	19	3,250	36
Stayer	4,076	132	3,991	340	3,600	15
Leaver	3,940	781	3,929	996	3,559	963
Total[c]	3,957	1,000	3,928	1,355	3,548	1,014
TOTAL SAMPLE (ALL WAGES)			3,823	3,369		

[a] Mean income for calendar year 1979, coded in 1972 dollars

[b] Military, Civilian, or Mixed

[c] Mean and frequency for all individuals with this type of wages

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